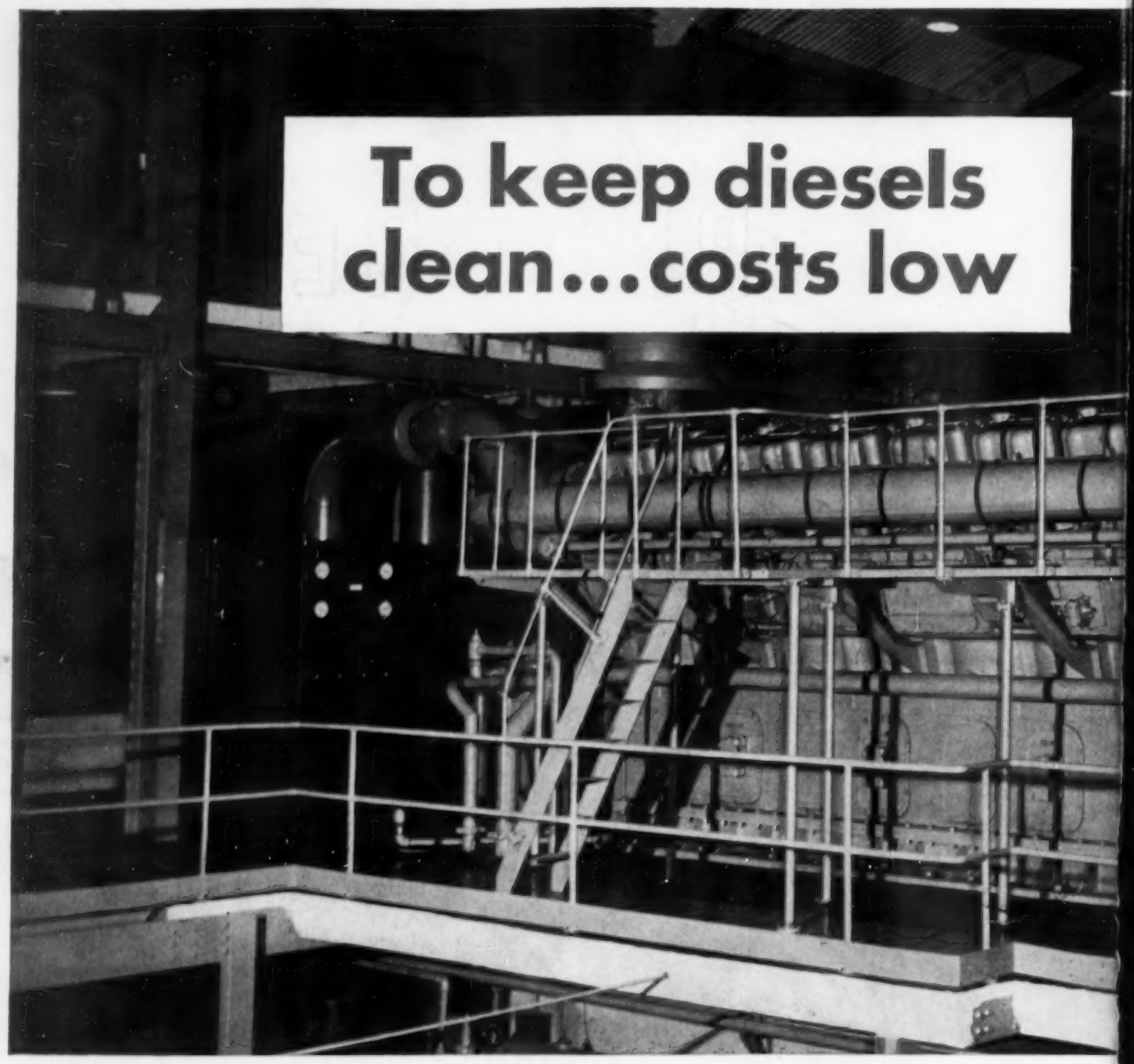
# DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

FIVE DOLLARS PER YEAR

NOVEMBER, 1955

FIFTY CENTS PER COPY



# To keep diesels clean...costs low

REGARDLESS of the engine, the operating conditions, or the fuel used, effective lubrication is the key to clean operation, low costs. Use one of the famous *Texaco Ursa Oils.*

There is a complete line of *Texaco Ursa Oils* — all especially refined and processed to make diesel, gas and dual-fuel engines deliver *more power* with *less fuel* over *longer periods* between overhauls. *Texaco Ursa Oils* keep engines free from harmful deposits, prevent ring-sticking, assure proper compression and full combustion. Maintenance costs and fuel consumption are correspondingly low.

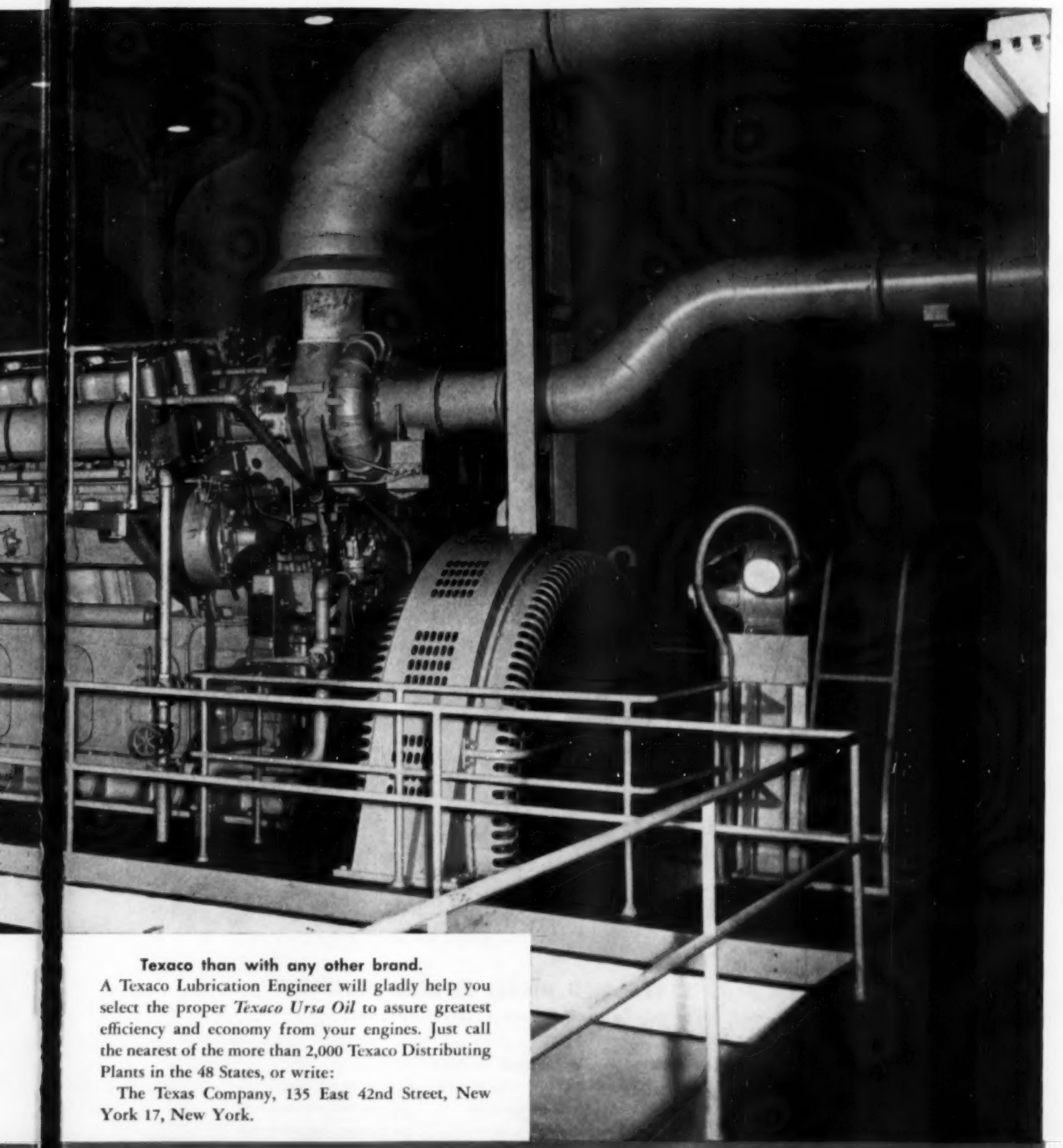
These benefits consistently delivered account for the fact that —

**For over 20 years, more stationary diesel h.p. in the U.S. has been lubricated with**

TUNE IN:
TEXACO STAR THEATER
starring
JIMMY DURANTE
on television...
Saturday nights, NBC.

TEXACO

TEXACO



**Texaco than with any other brand.**
A Texaco Lubrication Engineer will gladly help you select the proper *Texaco Ursa Oil* to assure greatest efficiency and economy from your engines. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, New York.

# URSA OILS

FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

# NOW *TURBOCHARGING*

## gives you 75% more horsepower in the NEW Series 498 General Motors Diesel Engines

***for tugs, towboats, dredges, tankers and cargo ships***

**You get these advantages —and savings with the new Series 498 GM *TURBOCHARGED* Diesel**

**75%** more power per cylinder

**60%** more horsepower per cubic foot

**60%** more horsepower per pound

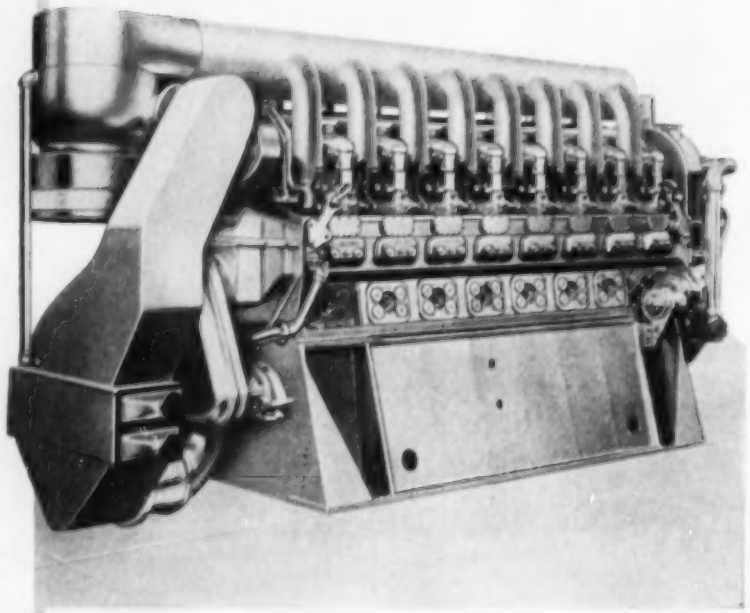
**12%** lower fuel consumption

**36%** minimum thermal efficiency

**For lower first cost, installation cost, maintenance and operating costs.**

***ENGINE RATINGS***

**6-cylinders, 1050 brake horsepower**
**8-cylinders, 1400 brake horsepower**
**12-cylinders, 2100 brake horsepower**
**16-cylinders, 2800 brake horsepower**



**CLEVELAND DIESEL**

## CLEVELAND DIESEL ENGINE DIVISION

GENERAL MOTORS • CLEVELAND 11, OHIO

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FRONT COVER ILLUSTRATION

Three Baltimore & Ohio locomotives, a passenger, a general purpose and a road freight engine lined up at Riverside, Baltimore, Maryland.


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# DEAD END FOR DUST!

Multi-Duty Filters clean intake air for six 2000 H.P. Worthington gas engines for Texas Illinois Natural Gas Pipeline Co., New Caney, Tex. Note use of AAF intake deflectors which assure maximum weather protection and serve to reduce shock waves emanating from air intake.

## AAF MULTI-DUTY FILTERS ASSURE CLEAN INTAKE AIR AUTOMATICALLY

THERE'S a big investment tied up in these six 2000 H.P. gas engines that can quickly be torn down by dust. That's why the matter of filter selection was of prime importance—and resulted in the selection of AAF Multi-Duty Self-Cleaning Filters.

"Variables" have no place in the cleaning of intake air. Uniform air delivery, constant efficiency, low operating resistance and infrequent maintenance are "musts" for true dust protection. Multi-Duty measures up on every count because this filter keeps itself "fit" through continuous self-cleaning action.

**Write For New "TELL ALL" Catalog**

This 16-page, illustrated catalog presents the detailed story of Multi-Duty design and performance. Shows you how filter is adapted for indoor or outdoor installation—for smooth or pulsating air flow application. Capacities, dimensions, weights, installation instructions — all are incorporated to give you a clear-cut picture of how Multi-Duty solves air cleaning problems easily, effectively and economically.

Write for your *free* copy today. Ask for Catalog 150-B.

AAF herman nelson

**American Air Filter**
COMPANY, INC.

American Air Filter of Canada, Ltd., Montreal, P. Q. • 408 Central Avenue, Louisville 8, Kentucky

# TOMORROW'S DIESELS
## *Will depend on* ERIE FORGE CRANKSHAFTS

PRECISELY machined Erie Forge Crankshafts have, for many years, been synonomous with highest quality workmanship. At Erie Forge & Steel Corporation every step in production—from ingot to finished crankshaft, is under one control, one supervision. Every operation falls under closest scrutiny, thus assuring perfection in material specification, forging, machining and finishing. Today's diesels for industry, ships and locomotives depend on Erie Forge Crankshafts. Diesel engines of tomorrow will, too, because Erie Forge & Steel Corporation produces the finest forging you can buy.

**ERIE FORGE & STEEL CORPORATION**
ERIE, PENNSYLVANIA

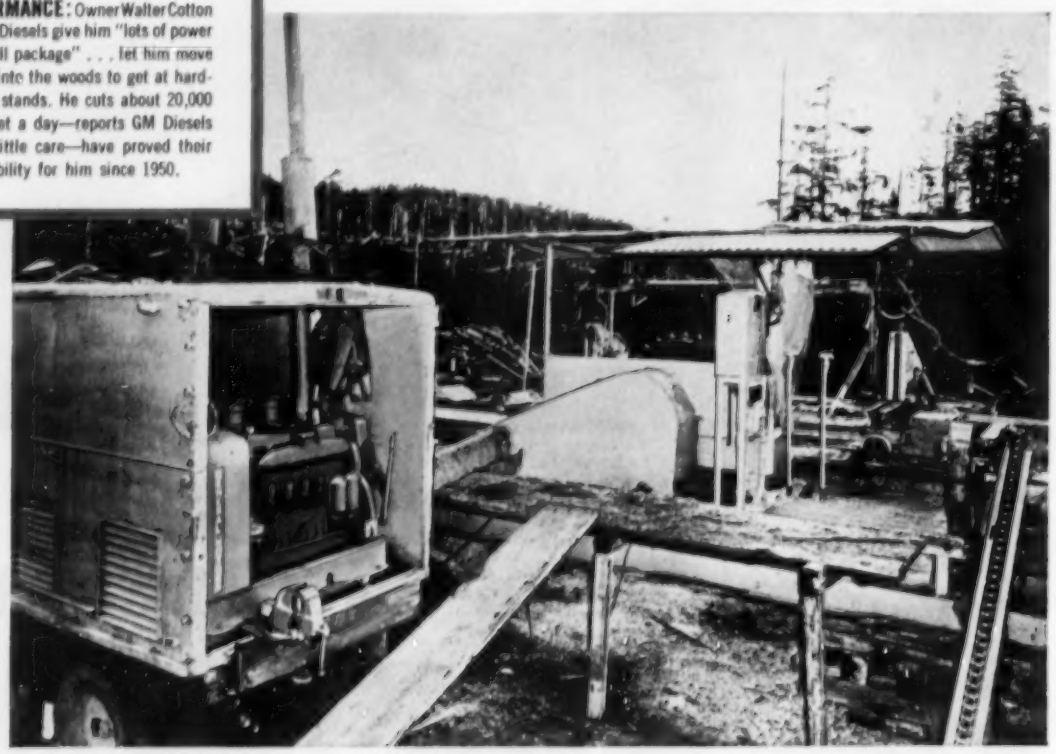
**GM DIESEL**
**CASE HISTORY No. IA6-111**

**USER:** Cotton Brothers, Spanaway, Washington.

**INSTALLATION:** Two GM "6-71" Diesels. #1 engine operates head rig. #2 Diesel drives 100-KW generator set supplying power for log haul and cut-off saw, edger, blowers, air compressor.

**PERFORMANCE:** Owner Walter Cotton says GM Diesels give him "lots of power in a small package" . . . let him move his mill into the woods to get at hard-to-reach stands. He cuts about 20,000 board feet a day—reports GM Diesels require little care—have proved their dependability for him since 1950.

# "Lots of Power in a small package"



YOU'LL find a General Motors 2-cycle Diesel delivers more usable power for its size and weight than any other Diesel.

To lumbermen that means faster, easier, cheaper moves—means reaching hard-to-get-at stands impossible to reach with big, bulky power plants.

But a GM 2-cycle Diesel gives you more than portability. Its 2-cycle operation delivers power at every piston downstroke—twice as many strokes per crankshaft revolution as a 4-cycle Diesel. That means quicker response to governor controls—steadier, more uniform saw operation—faster recovery when the blade hits tough going.

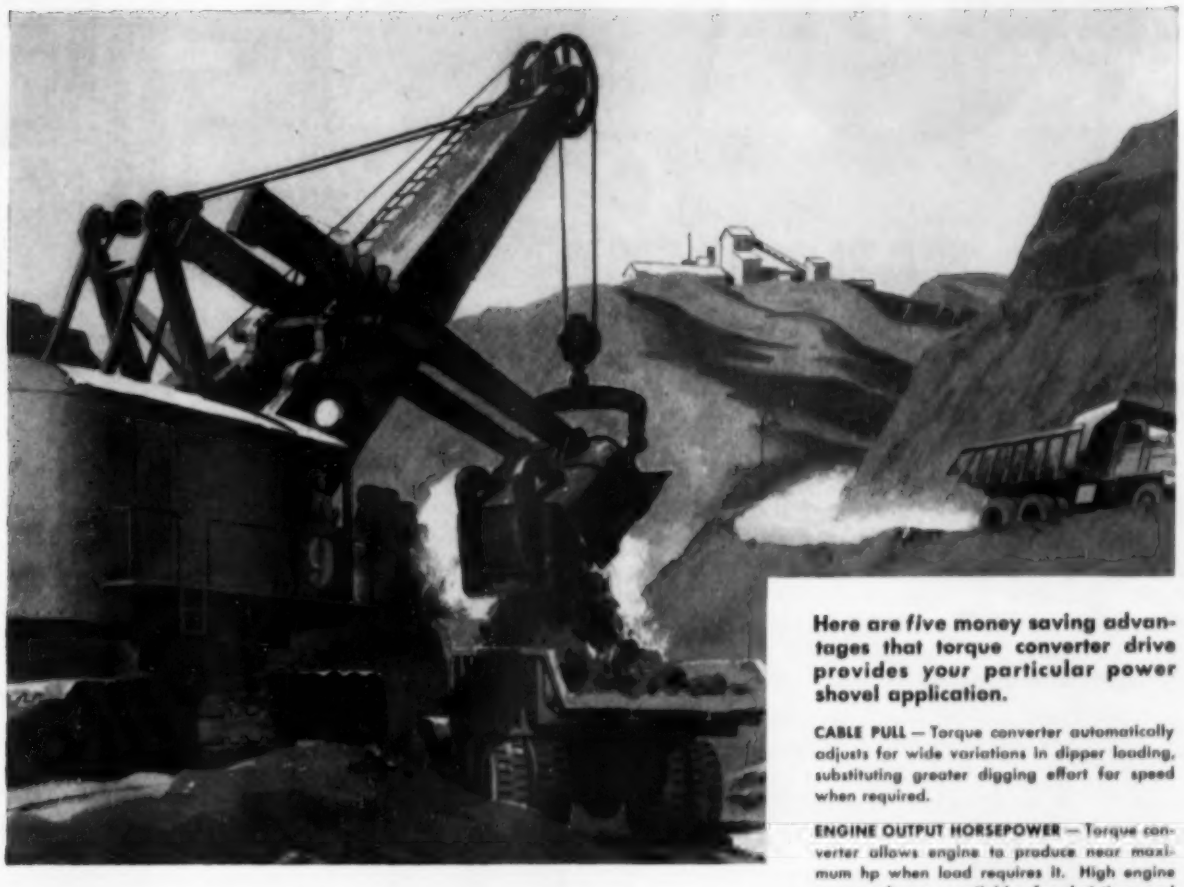
And with a GM Diesel you'll burn fewer gallons of safer, cheaper fuel—get push-button starts even in damp, cold weather. You won't need service often but, when you do, you'll get fast action and quick delivery of low-cost parts from your local GM Diesel distributor. Call him today for details on GM Diesel power in all your logging and lumbering equipment.

**DETROIT DIESEL ENGINE DIVISION**

GENERAL MOTORS • DETROIT 28, MICHIGAN

Single Engines . . . 30 to 300 H.P. Multiple Units . . . Up to 893 H.P.

GM GENERAL MOTORS DIESEL POWER



# $750 SAVED IN ONE SEASON

## using Torque converter on power shovel

A prominent contractor recently reported that he saved $750 in one season using a Twin Disc *Three-Stage* Torque Converter on one of his power shovels.

This total was comprised of savings on three different phases of the shovel's application. (1) Cable—on two shovels with direct drive, cables were replaced *seven times* on one and *eight times* on the other. With torque converter drive, however, the cable was replaced *only three times*. Resultant saving: $350. (2) Maintenance costs — a saving of 12½ cents per hour, or a season total of $250 on the shovel with the Twin Disc Converter. (3) Fuel consumption — the torque converter unit used ½ gallon less fuel per hour, saving $140 in the 2,000 hour season.

*You* can realize a *similar* saving from *your* power shovels. *Specify* Twin Disc Torque Converters for your new units or *install* them in your existing equipment. For full details see your equipment or engine distributor. Write for bulletin 135-D.

*All facts in the above story are contained in an actual case history. We have not identified the operation because publishing the owner's name would reveal confidential information.*

**Here are *five* money saving advantages that torque converter drive provides *your* particular power shovel application.**

**CABLE PULL** — Torque converter automatically adjusts for wide variations in dipper loading, substituting greater digging effort for speed when required.

**ENGINE OUTPUT HORSEPOWER** — Torque converter allows engine to produce near maximum hp when load requires it. High engine power always available for hoisting and crowding.

**ENGINE SPEED** — Torque converter provides high engine speed throughout its working range, and higher hp output is available for heavy digging and hoisting loads. Converter equipped engine can't lug. Heavy overloads will not kill the engine.

**LOWER MAINTENANCE COST**—Torque converter reduces peak loads throughout shovel drive train. Cushioning shocks increases wear life for most parts subject to fatigue failure.

**LONGER CABLE LIFE** — In proved installations, even frayed cables with short life expectancy have been known to last a year or more where a torque converter has provided smooth, sustained output power.

TWIN DISC

**TWIN DISC**
**Torque Converters**

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

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# ELECTRIC POWER

## DELCO-REMY HEAVY-DUTY A.C. GENERATORS

Delco-Remy A.C. generators with companion regulators and rectifiers are the hearts of 12-volt A.C.-D.C. electrical systems designed specifically for modern diesel buses with fluorescent lighting and extra-heavy electrical loads.

Desirable performance characteristics include cut-in at low generator rpm . . . maximum outputs (ranging up to 180 amperes) at low to medium speeds. The new generators supply not only alternating current for fluorescent lights but also ample direct current for the heaviest electrical loads coupled with lengthy engine-at-idle periods.

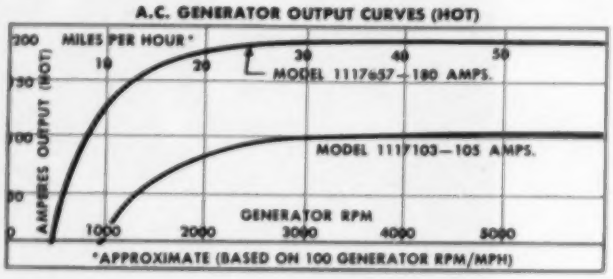
Impressive features of the new generators are their light weight, very high output capacity, and ability to operate over a wide speed range with greatest efficiency. Specify Delco-Remy electrical equipment on your new buses.

**A.C. GENERATOR PERFORMANCE DATA (HOT)**

| Model | Volts | Cut-in RPM | Curb Idle Amperes* | Maximum Amperes | Power Watts SAE | Recommended For |
|---|---|---|---|---|---|---|
| 1117103 | 12 | 960 | 5 | 105 | 1575 | All speeds. |
| 1117657 | 12 | 550 | 130 | 180 | 2700 | All speeds. |
| 1117062-3-4 | 6 | 750 | 38 | 90 | 720 | All speeds. |

*APPROXIMATE (BASED ON 1000 GENERATOR RPM)

**A.C. GENERATOR OUTPUT CURVES (HOT)**




*APPROXIMATE (BASED ON 100 GENERATOR RPM/MPH)

## DELCO-REMY HEAVY-DUTY D.C. SPLIT-FIELD GENERATOR (120-Ampere Output Capacity)

The Delco-Remy 12-volt split-field generator and its companion regulator are rugged and dependable—designed to meet the needs of diesel transit buses having increased electrical loads coupled with a high percentage of engine idling time.

Desirable performance characteristics include low cut-in, maximum output at less than 1,000 generator rpm. Note performance table at right.

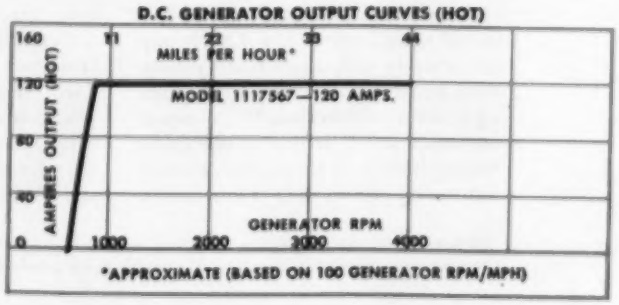
Operating benefits include reduced battery cycling, long battery life, and a simplified electrical system with sustained voltage—at no sacrifice in ruggedness or dependability.

**D.C. GENERATOR PERFORMANCE DATA (HOT)**

| Model | Volts | Cut-in RPM | Curb Idle Amperes* | Maximum Amperes | Power Watts SAE | Recommended For |
|---|---|---|---|---|---|---|
| 1117567 | 12 | 560 | 120 | 120 | 1800 | Low speed & idling. |

*APPROXIMATE (BASED ON 1000 GENERATOR RPM)

**D.C. GENERATOR OUTPUT CURVES (HOT)**

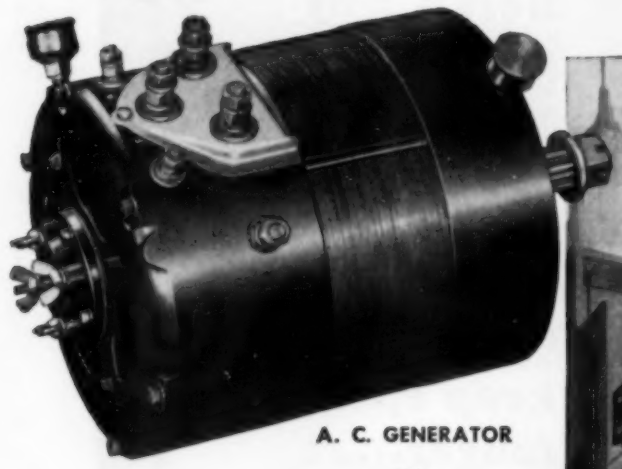



*APPROXIMATE (BASED ON 100 GENERATOR RPM/MPH)

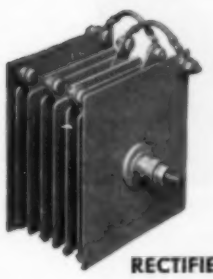
Delco-Remy
ELECTRICAL SYSTEMS

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

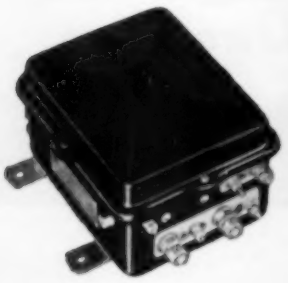
# right for the job



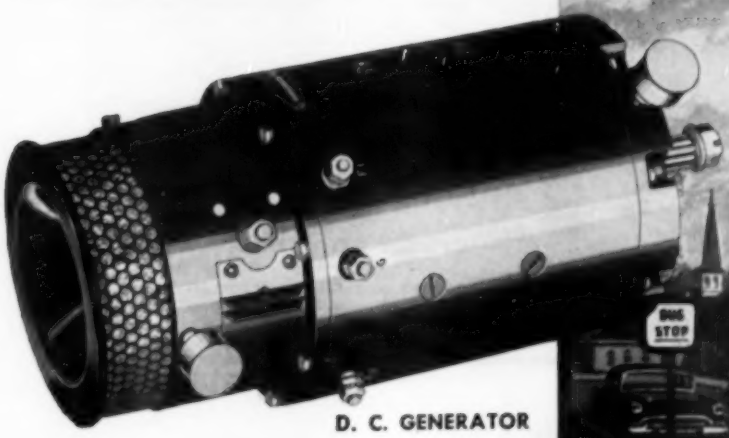
A. C. GENERATOR



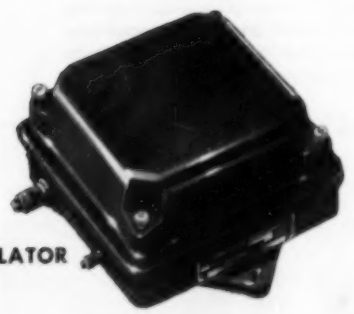
RECTIFIER



REGULATOR

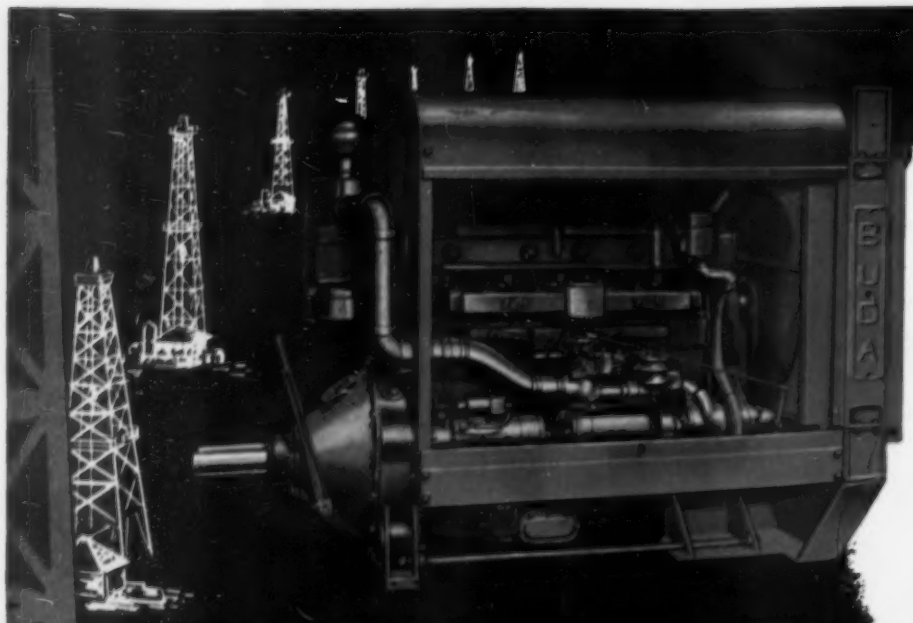


D. C. GENERATOR



REGULATOR

WHEREVER WHEELS TURN OR PROPELLERS SPIN

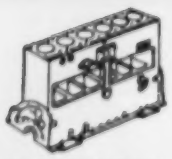


Here's why

# BUDA OILFIELD ENGINES

keep operating longer...at lower cost

BUDA Oilfield Engines are big, rugged engines — built to deliver maximum performance under the toughest operating conditions. Every component in Buda Diesel, Natural gas and butane engines is designed for longer life; greater efficiency or stamina to insure you of more horsepower hours with less maintenance at lower all around cost.

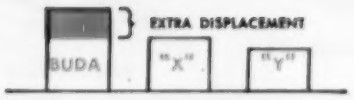


**ONE-PIECE CAST BLOCK**

Greater strength and rigidity of Buda Monolithic block design insures longer engine, crankshaft and bearing life... less maintenance.

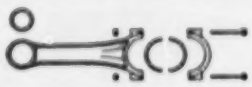
**EXTRA STRONG, FORGED and TOCCO HARDENED CRANKSHAFT**

Larger diameter Buda crankshaft, with thick, wide cheeks has the strength to withstand heavy loads, sudden shock. Smoother running is assured by precision dynamic balancing.




**BIG PISTON DISPLACEMENT**

Extra displacement means greater reserve power — lighter engine loading — less strain on the engine — more power in the normal operating range.



**GREATER ROD BEARING AREA**

Rod bearings are stronger... have more load carrying ability... longer service life. Connecting rods rifle drilled for pressure lubrication to wrist pins.

**5 RING PISTONS**

Increased contact area gives better compression seal, better oil control, longer ring and sleeve life — lower maintenance costs.

**OVERSIZE PISTON PINS**

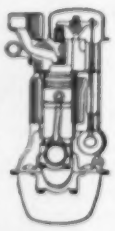
Larger overall bearing area gives greater strength and load carrying ability — longer life, less downtime and maintenance.

**SUBMERGED TYPE, FULL PRESSURE GEAR DRIVEN OIL PUMP**

Buda lubrication system is positive displacement type — full pressure oil flow through drilled internal passages insures proper lubrication of all parts of the engine.

**HIGH VOLUME WATER PUMP, MAXIMUM FLOW COOLING SYSTEM**

Large capacity, force feed water pump... full length water jackets, greater cooling area, full flow thermostat and by-pass system provide pinpoint temperature control, longer engine life.



*See your nearby Buda Division Distributor for complete details on why Buda Oilfield Engines are your best buy in power. Write for Bulletin and specifications.*

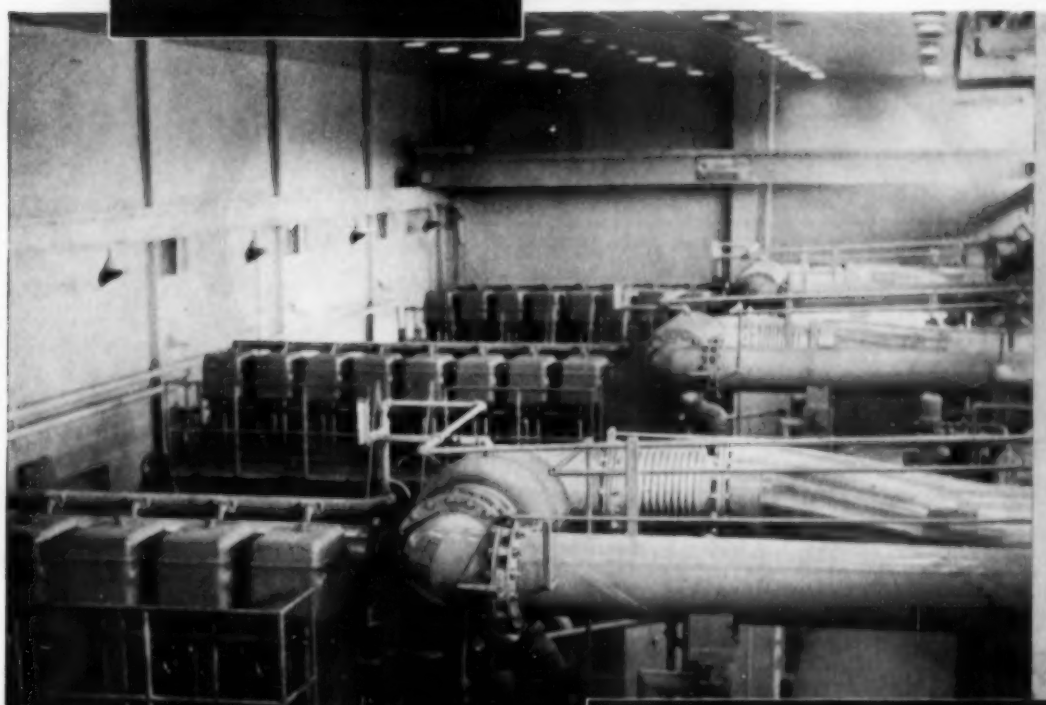
**BUDA DIVISION • Harvey, Illinois**

80-30

**ALLIS-CHALMERS**

**DE LAVAL**
**HIGH PRESSURE TURBOCHARGERS**

## *efficiently serve diesels at Lakehead Pipe Line Company*



*Exclusive*
**MONOROTOR**
*Construction*



Located in an outlying district in Northern Minnesota, this oil pumping station of the Lakehead Pipe Line Company must have *dependable, efficient* equipment. That's why Nordberg Diesel engines *with De Laval High Pressure Turbochargers* were chosen for this service.

The De Laval turbochargers efficiently utilize the exhaust gases to supply the high intake air requirements of these 1800 BHP, eight cylinder, four-cycle Supairthermal engines. Shown in the photograph are three units. Six other identical engines operate in pairs in three other stations of this company.

Due to the exclusive Monorotor design, De Laval High Pressure Turbochargers have a pressure ratio up to 3:1, as well as far higher pressure and turbine efficiencies than those found in conventional turbocharger systems. They are self-adjusting to engine loads, can be used with 4- *and* 2-cycle engines.

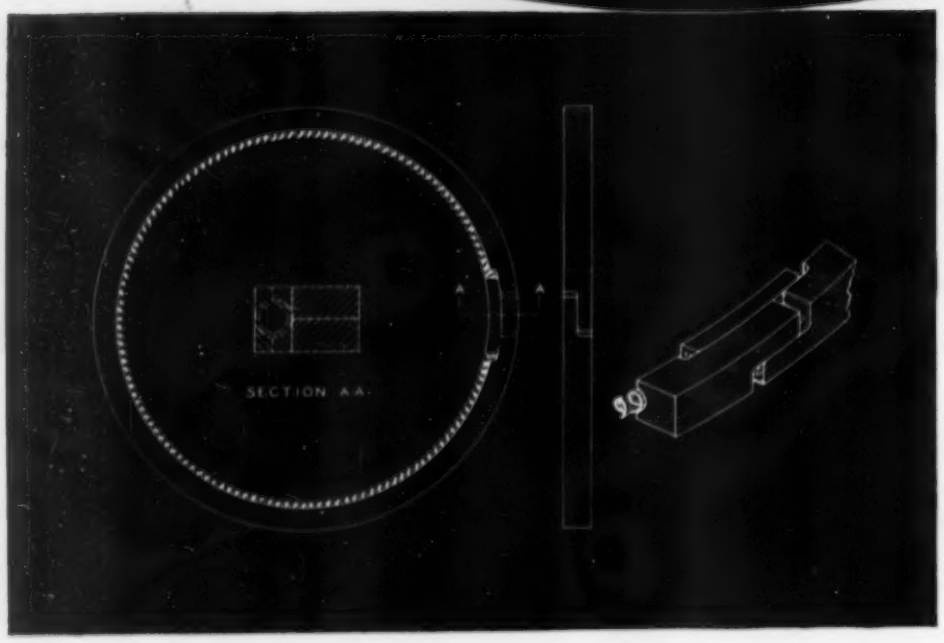
*Write for De Laval Bulletin 8000 giving comprehensive curves and flow range diagrams.*

**DE LAVAL** *Turbochargers*

DE LAVAL STEAM TURBINE COMPANY
*883 Nottingham Way, Trenton 2, New Jersey*

DL 554

## Look to COOK




1. Complete flexibility assures perfect wall contact at all times. No wear in period required.
2. Sealing function is double acting which makes ring ideal for all services and simplifies installation.
3. Step-cut construction seals joint contact with cylinder. Special overlapping gib seals joint at groove sides. Seal complete at all points.
4. May be fabricated from any material, including bakelite.
5. Spring actuation independent of groove bottom which assures uniform distribution of tension.

*for Better Rings!*

# COOKTITE 301-1X COMPRESSION RING— the Perfect Seal, in Sizes 6 to 60"!

***Ideal for any Service—Available in any Material!***

*FROM the minute it's installed and throughout its long life,* the new Cooktite 301-1X compression ring fits tight around the cylinder — and every inch of the stroke — even in worn or out-of-round cylinders. The secret is in its design — uniform tension and perfect flexibility are provided by the spring member which is independent of the groove bottom. Step-cut construction seals the cylinder contact completely, and prevents blowby. A separate overlapping gib seals the inner joints at both sides of the groove, and all parts have free toggle action to prevent key locking and breakage.

The Cooktite 301-1X is available in sizes from 6" to 60" in any material to suit the service intended. For larger sizes, grooves may be reduced to cut down both ring and piston weight, thus reducing inertia forces and the effect of G values.

The Cooktite 301-1X is extremely easy to install and is ideal for all types of service — compressors, internal combustion engines, liquid pumps, pneumatic clutches, chucks, valves, etc. Mail the coupon today for additional engineering data on your particular problem.

**C. LEE COOK COMPANY**

*Sealing Pressures Since 1888*

C. Lee Cook Company
940 South 8th Street
Louisville 3, Kentucky

Gentlemen: Please send me complete engineering data on the Cooktite 301-1X compression ring.

Firm_____

Street_____

City_____ State_____

Attention:_____

Type of Units_____

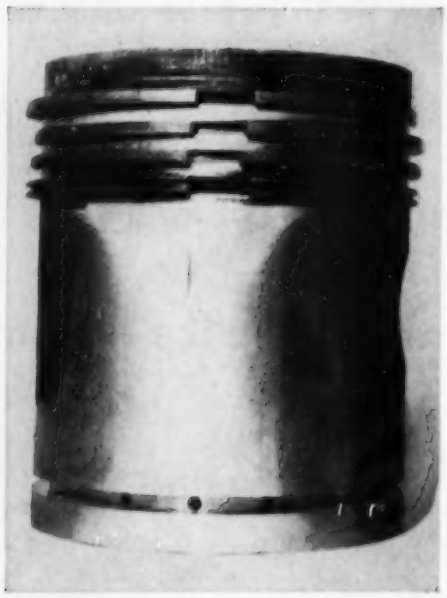
# The Engineer's Field Report

CASE HISTORY

LUBRICANT RPM Delo Oils

FIRM Del Este Water Company, Modesto, Calif.

## Engine powers pump for 28,000 hours—sleeve wear is less than 0.002 inch!



PUMPING UP TO 2200 GALLONS OF WATER PER MINUTE, a 165 h.p. natural gas fueled Waukesha engine ran 24 hours a day for more than three years in the Del Este Water Company plant at Modesto, California. Driving a turbine pump, it worked against a constant head, with speed controlled to maintain a set pump discharge pressure. In spite of this tough service, RPM DELO Special Lubricating Oil kept engine in perfect operating condition right up to time of inspection. Oil consumption actually was less for the last 8000 hours service than for the first 8000. Inspection showed sleeve wear only 0.001 to 0.0015" with no taper; crankshaft "miked" within factory standards. As shown above, rings and grooves are clean, sleeves unscored. Same sleeves and pistons were reinstalled and engine went back into pumping service.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

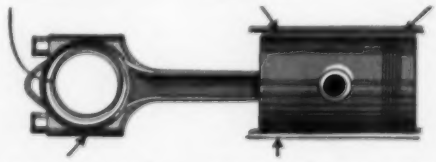
FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies listed below.

### Why RPM DELO Oils prolong engine life

Special compounds stop corrosion

Anti-oxidant resists lacquer formation

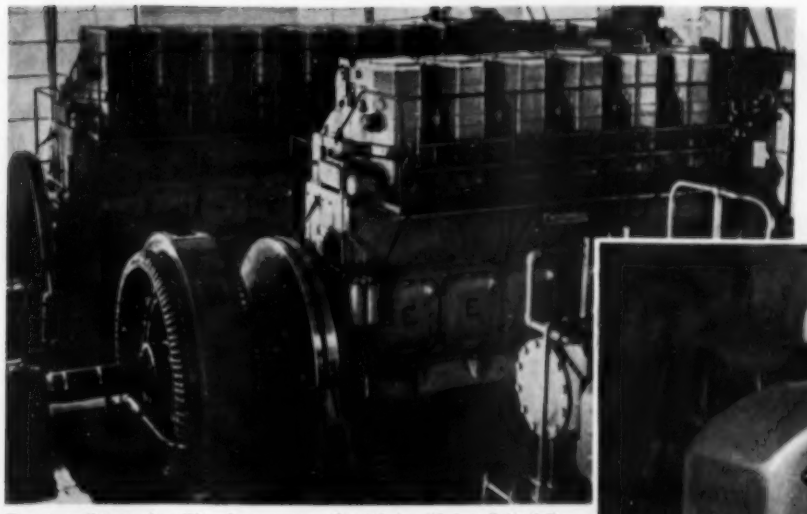
Detergent keeps parts clean



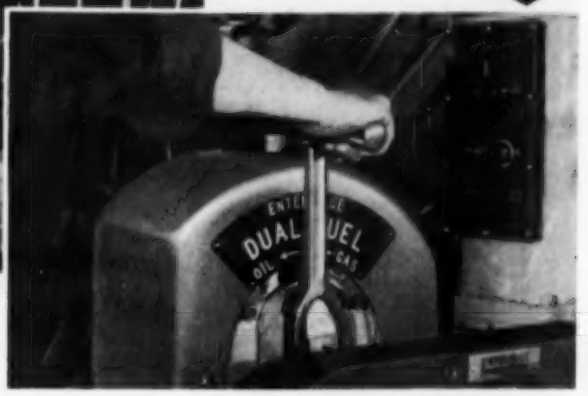
Inhibitor resists foaming

Metal-adhesion qualities keep oil on parts in running or idle engines

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado



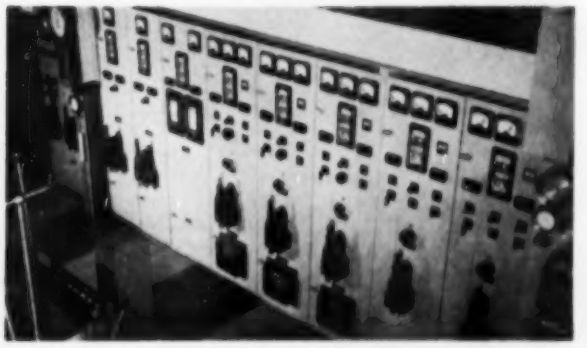
**The two Enterprise Diesels were equipped** for "Select-O-Matic" Dual Fuel operation in the field after installation, taking full advantage of low-cost gas for fuel.




**A single lever simplifies fuel selection.** After manual setting, any fluctuation in gas pressure is compensated for automatically, thereby maintaining constant engine speed and load.

# City of Broken Bow, Nebraska, Switches to Enterprise Dual Fuel—Saves $36,000 a Year!

**Broken Bow's model municipal utility plant** is under the capable supervision of L. E. Clark. *"These Enterprise Engines have given us exceptional performance in every way,"* says Clark, *"we're more than satisfied with their excellent record."*



**Modern control panel keeps tab** on plant production. A unique "Metered Maintenance" plan developed by Mr. Clark keeps operating and maintenance costs at a minimum.

**Electricity comes cheap at Broken Bow,** Nebraska, where two Enterprise "Select-O-Matic"® Dual Fuel Engines, running on natural gas with pilot oil, have cut $100 a day in fuel costs since their installation three years ago. Because of their low cost operation, they have virtually replaced the three original engines, which are now used for standby and peak load service only.

**Intercooling boosts output.** Even though Broken Bow's summer and winter temperatures vary greatly, the Enterprise Engines, through Intercooling, run at full load with no increase in temperatures or pressures. The result is greater KW output and economy.

**The real payoff** has been in greatly reduced electric rates, and a modern, dependable power plant that has paid for itself and is contributing to the general improvement fund.

Get full information on Enterprise Engines today. Units from 73 to 6933 HP in Diesel, Dual Fuel, Tri-Fuel, Spark Ignited Gas—for every stationary, municipal, and marine use.

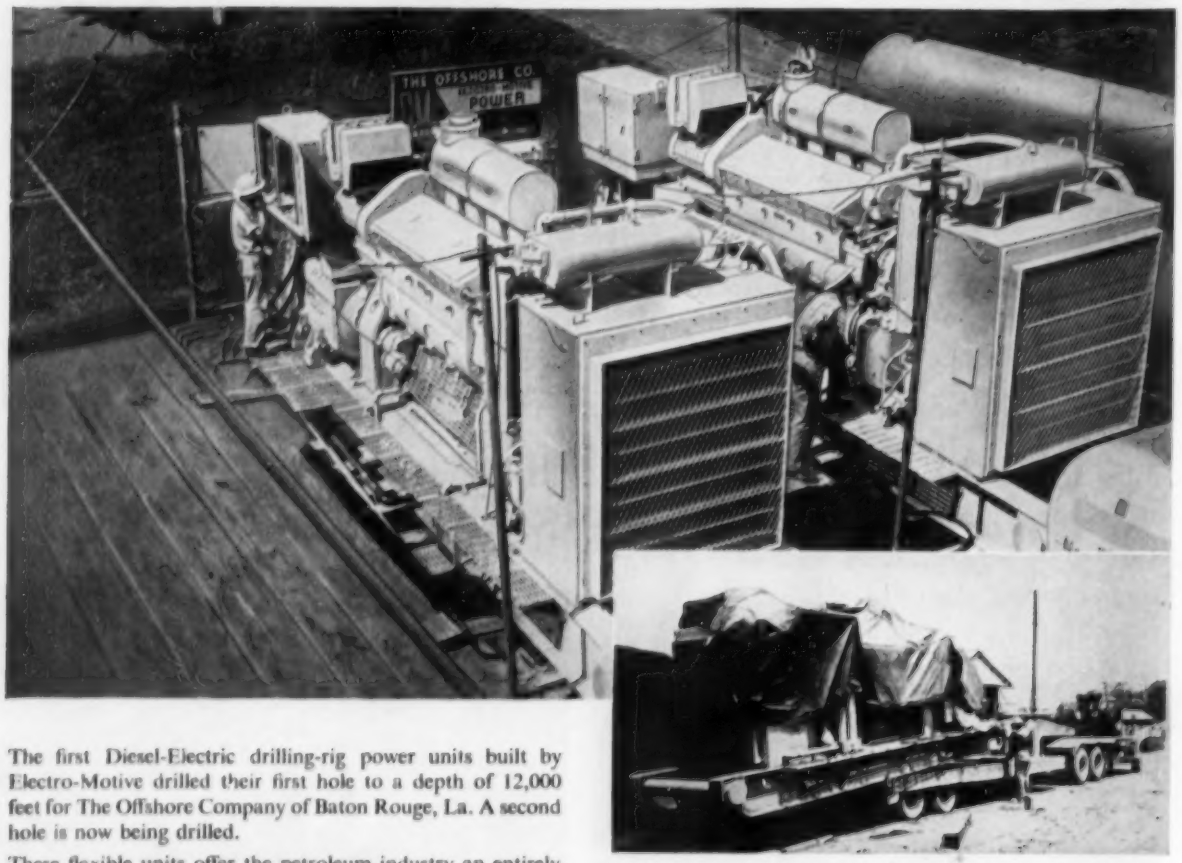
*Over a million horsepower at work the world over!*

**ENTERPRISE**
*dependable* **ENGINES**

**ENTERPRISE ENGINE & MACHINERY CO.**
Subsidiary of General Metals Corporation
18th and Florida Streets, San Francisco 10, California
Export Department, New York

Boston • Chicago • Denver • Des Moines • Fort Worth • Huntington • Jacksonville • Kansas City • Los Angeles
Minneapolis • New Orleans • New York • Pittsburgh • San Diego • Seattle • St. Louis • Tulsa • Washington, D.C.

# New Electro-Motive Drilling-Rig Power Plant Completes First Hole...for Offshore Company




The first Diesel-Electric drilling-rig power units built by Electro-Motive drilled their first hole to a depth of 12,000 feet for The Offshore Company of Baton Rouge, La. A second hole is now being drilled.

These flexible units offer the petroleum industry an entirely new concept in a Diesel-Electric drilling rig. A compact, lightweight package with all components engineered, built and backed by *one* manufacturer, the Electro-Motive unit features simplified control and rugged dependability at a cost far below that of previously built Diesel-Electric rigs and comparing favorably with Diesel-mechanical rigs.

Basic unit consists of eight-cylinder General Motors 567C two-cycle Diesel engine—developing 875 continuous horsepower—mounted on portable skid with two generators, generator control cabinet and engine cooling apparatus. Direct current electricity from the generators is supplied by cable to the 625-horsepower motors which, singly or in pairs, supply power for the mud pumps, draw works and rotary table.

**Unmatched Flexibility**

Power transmission cables are quickly and easily connected and disconnected with no bolting or taping required. Thus setup time is reduced to a minimum. Engine-generator units in land operation can be placed anywhere near the drilling site, with no need for heavy foundations or worry about alignment with mud pumps, draw works and rotary table as is required with mechanical rigs. In offshore operations, the advantage is that Electro-Motive power can be put into a minimum of space with important savings in high-cost deck area of barge.



*Maximum portability* of Electro-Motive Power Units is shown in this photo of skid-mounted 8-cylinder Diesel engine-generator set being delivered to Offshore Company drilling site near Houma, La.

For further information, write or call your nearest Electro-Motive representative.

**Electro-Motive Division offices located in New York City, Chicago, Jacksonville, St. Louis, Tulsa and San Francisco.**

## ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS • *In Canada:* GENERAL MOTORS DIESEL, LTD., *London, Ontario*

**World's Largest Builder of Heavy-Duty Diesel Engines and Electric Traction Equipment**

*Specialists for over 37 Years in*

**FLUID FLOW**

**AND**

**VIBRATION PROBLEMS**

Schwitzer has extensive Research and Engineering facilities and experienced technicians to develop an economical product—for the Flow of Air, Oil, Water and other Fluids—or the Isolation or Elimination of Vibration in your equipment, whether it is in the Automotive, Atomic, Aircraft, Agricultural, Earth Moving, or other fields.

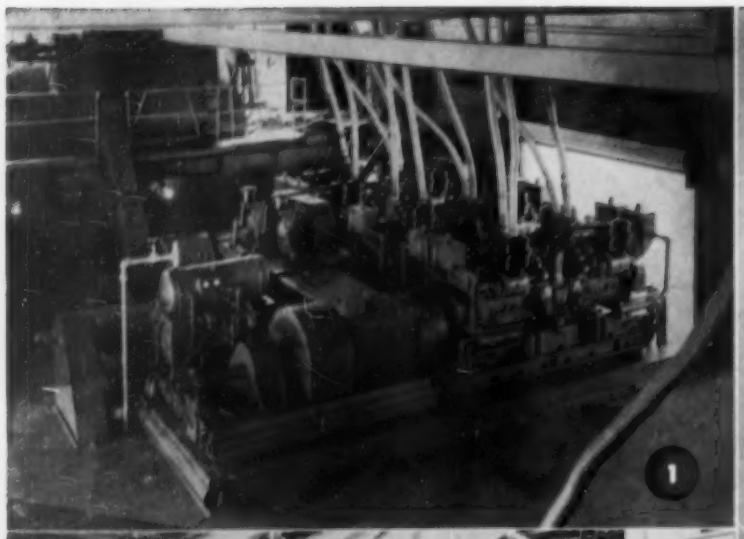
Schwitzer utilizes the most modern production facilities for the Fabrication, Assembly and Testing of these Precision Products—for high or low volume production.

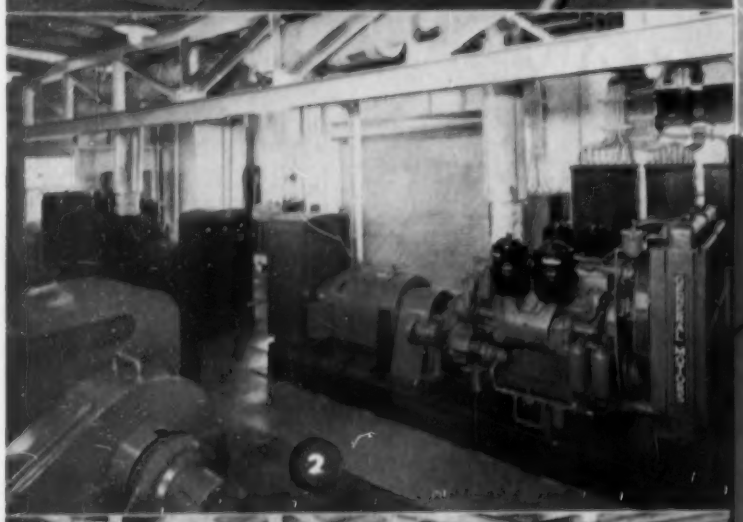
These services are available to you for product development applications in many diversified fields.

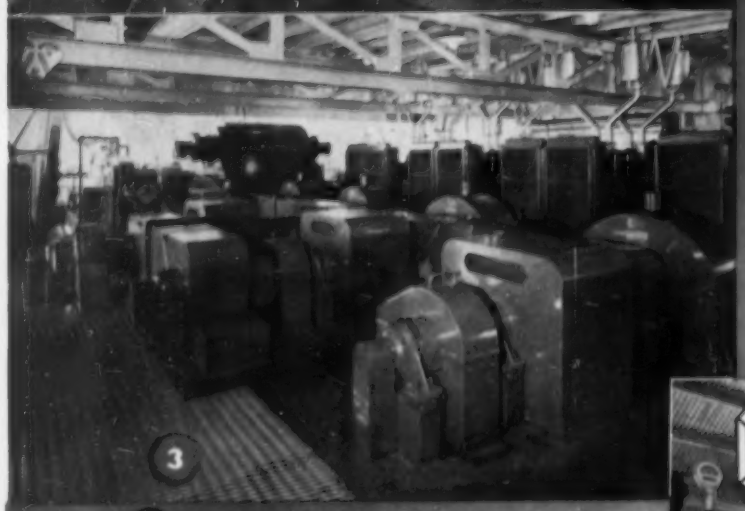
**SCHWITZER**

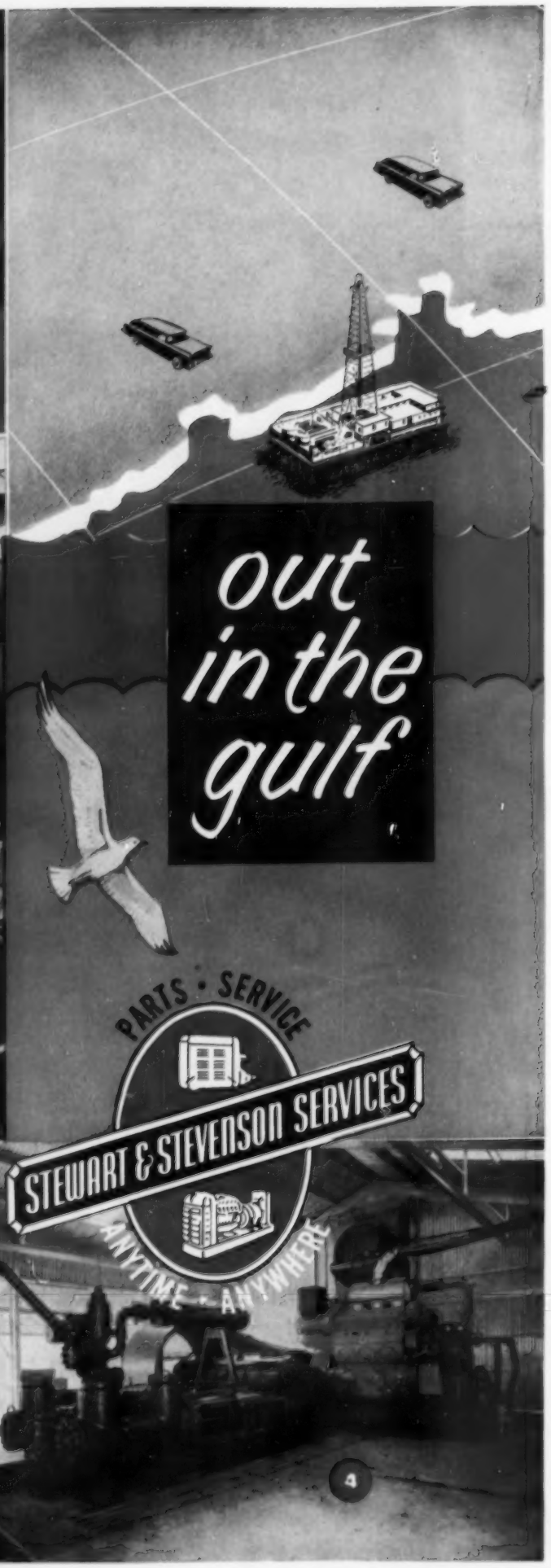
**CUMMINS COMPANY**

INDIANAPOLIS, INDIANA










1 These three GM quad engines with a rated continuous horsepower of 520 each power a Southeastern Drilling Co. barge. A GM Diesel twin 260 continuous horsepower engine powers the 7½" x 14" mud mixing pump on the rig and the two light plants are each powered by a single GM Diesel 6-71 engine.

2 Electricity on the "Mr. Gus" is supplied by four Model 12-GD149 Stewart & Stevenson Diesel Generator Sets.

3 The drawworks and compound on the "Mr. Gus" are powered with four Model 24103 General Motors Diesel Quad Units from Stewart & Stevenson.

4 Here is a typical mud pump application using the 625 continuous horsepower Model 567-C General Motors Diesel Engine to drive an Oil Well 20 P mud pump.

*Glenmark Drilling Co.

# WHERE SERVICE and DEPENDABILITY REALLY COUNT

## GM DIESEL BY STEWART & STEVENSON *IS FIRST CHOICE*

**From the start of the extensive offshore drilling program back in 1947 right up to the recent dedication of the "Mr. Gus,"* more offshore drilling rigs operating along the Gulf Coast are powered with General Motors Diesel Engines by Stewart & Stevenson than any other make.**

**Today when you seriously consider all of the factors, there are more reasons for selecting power from Stewart & Stevenson than ever before.**

Here are a few important reasons:

1. **New and Wider Choice of Power Selection.** With the addition of the larger Series 567C line of Diesel and dual fuel engines, Stewart & Stevenson offers a complete range of drilling engines up to 1750 HP each.

2. **Diesel Electric Drive.** The new 567C Diesel electric drive units available from Stewart & Stevenson offer the acknowledged superiority, flexibility and dependability of Diesel electric drive at low initial costs.

3. **Engineered Installation.** Stewart & Stevenson engineers recommend the best engine for the purpose. Our factory is available for the design and fabrication of the substructure, drives, and other necessary auxiliaries and our factory-trained engineers make sure the engines are properly installed.

4. **Guaranteed Performance.** Stewart & Stevenson engineers and factory-trained servicemen are on the location making sure that the installation is complete and the engines operating at top efficiency.

5. **Parts and Service Responsibility.** A factor of utmost importance in making GM Diesels first in offshore power is the attitude of Stewart & Stevenson in assuming full parts and service responsibilities. We believe in the statement that "engines are no better than the parts and service organization behind them" and actions are guided accordingly. When you deal with Stewart & Stevenson you can be sure that if and when service problems should develop, Stewart & Stevenson will assume the full responsibility for their correction and will provide the materials, services and experience to correct them.

## STEWART & STEVENSON SERVICES, INC.

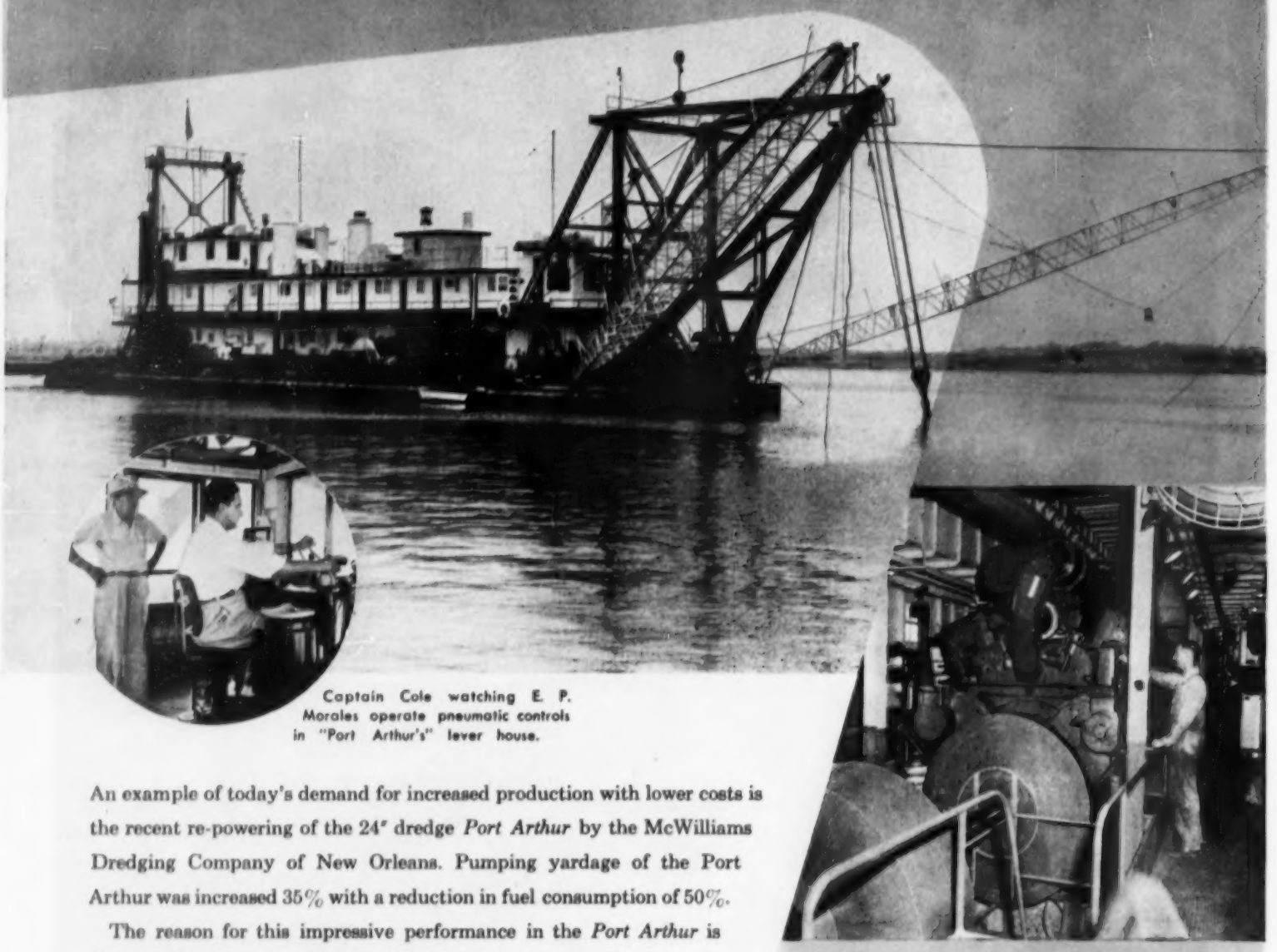
| | |
|---|---|
| Main Office and Plant: | 4516 Harrisburg Blvd., Houston 11, Texas. Phone WOodcrest 9691. |
| Branches: | Corpus Christi, Dallas, Lubbock, Wichita Falls, San Juan, Odessa. |
| Representatives: | San Antonio, Longview, Brownsville. |
| Distributors of: | General Motors Diesel Engines, Climax Blue Streak Engines, Chrysler Industrial and Marine Engines, Petter Diesel Engines. |
| Fabricators of: | Electric Power Units, Electrical Control Equipment, Portable Pumping Units, Red Head Pumps. |

PARTS · SERVICE
STEWART & STEVENSON SERVICES

THE NATION'S LARGEST DISTRIBUTOR OF GM DIESEL ENGINES

# NORDBERG *Supairthermal*® DIESEL

## Boosts Production 35%—Cuts Fuel Consumption 50% on McWilliams Dredge "*Port Arthur*"



Captain Cole watching E. P. Morales operate pneumatic controls in "Port Arthur's" lever house.

Chief Engineer R. J. Bienvenu alongside the big Nordberg *Supairthermal* Diesel in "Port Arthur's" engine room.

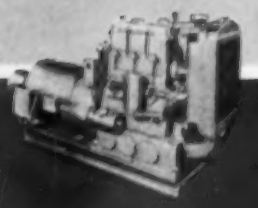
An example of today's demand for increased production with lower costs is the recent re-powering of the 24" dredge *Port Arthur* by the McWilliams Dredging Company of New Orleans. Pumping yardage of the Port Arthur was increased 35% with a reduction in fuel consumption of 50%.

The reason for this impressive performance in the *Port Arthur* is the new Nordberg *Supairthermal* V-type Diesel engine, direct-connected to a new 24" centrifugal pump. Normally rated at 3600 bhp at 514 rpm, the engine develops 2800 bhp at 380 rpm, which is the speed of the pump.

For the best answer to *your* power needs, look to Nordberg *Supairthermal* Diesels, in sizes up to 5000 hp.

*NORDBERG MFG. CO., Milwaukee, Wis.*

**NORDBERG**
**DIESEL ENGINES**



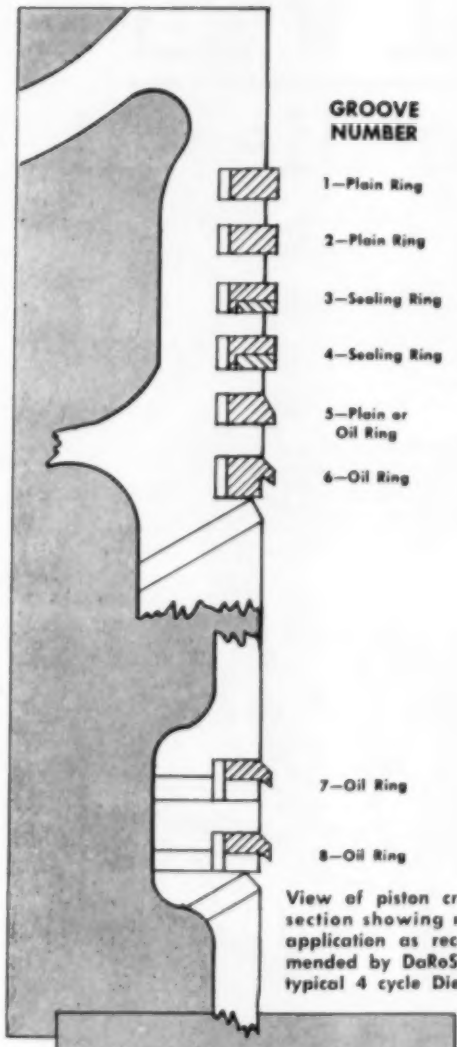
**NORDBERG**
**POWER CHIEF**
**DIESELS**

For compact, economical auxiliary service, be sure to check the advantages of these 1, 2 and 3 cylinder diesel power units developing from 10 to 45 hp, and as "packaged" generator sets producing from 6 to 30 kw.

SM555

© 1955, Nordberg Mfg. Co.

# SAVE FUEL...
## up to 15% with DaRoS Piston Rings




View of piston cross-section showing ring application as recommended by DaRoS, in typical 4 cycle Diesel.

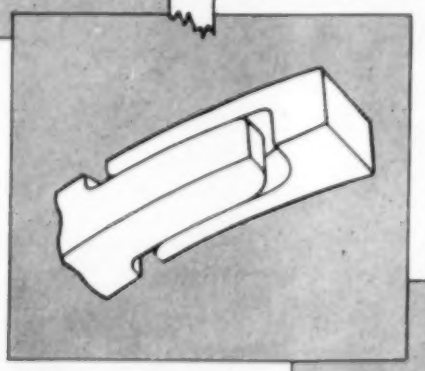
### Here Are the Three Basic Reasons Why Users of DaRoS Rings Save 10% to 15% on Fuel!

1. DaRoS Rings do *not* leak—there's no blowby—no compression leakage—no loss of efficiency when you use DaRoS leakproof Sealing Rings. They successfully seal—in both new and worn cylinders. Typical DaRoS application on left shows how you can reduce compression loss—increase efficiency—save fuel up to 15%.

2. DaRoS Rings—made of Swedish Charcoal Iron—out-wear others—have a lower rate-of-wear—50% to 90% on rings and cylinders!

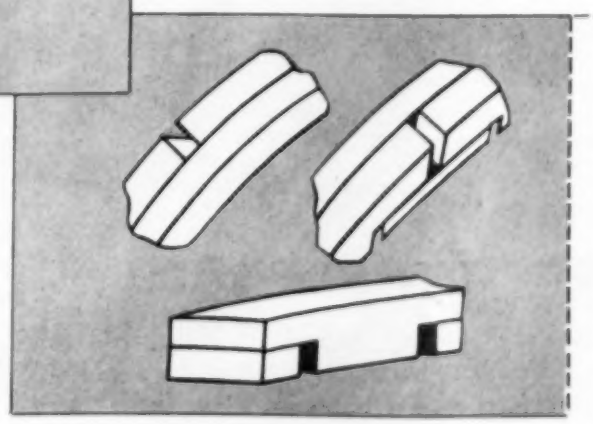
3. DaRoS Rings are made by Davy Robertsons Maskinfabrik — the world's first manufacturer of commercial piston rings. DaRoS furnishes original factory equipment to many of the leading engine builders. Over 50% of all of the motorships (above 1000 ton capacity) throughout the entire world are fitted with DaRoS Piston Rings.

Reduce your fuel costs NOW by installing DaRoS Rings in all of your engines —wire—write or phone for prices.



**IMMEDIATE DELIVERY**

... from Chicago on popular sizes for Industrial Engines



ABOVE. View of DaRoS ONE-PIECE Sealing Ring #201 recommended for new cylinders.
RIGHT. View of DaRoS TWO-PIECE Sealing Ring #206 recommended for worn cylinders.
*(This is another ad in a series designed to tell Diesel Operators the important story about DaRoS Swedish Iron Piston Rings.)*

DaRoS

**AMERICAN CORPORATION**

D. D. COOK, *President*

8128 N. Lawndale Avenue
Skokie (Suburb of Chicago), Illinois U.S.A.
Distributors for North, Central and South America

DaRoS American Corporation
8128 N. Lawndale Ave., Skokie, Illinois
Gentlemen: Send me complete information on DaRoS Rings.

NAME_____

FIRM NAME_____

STREET ADDRESS_____

CITY_____ STATE_____

# MORE DRIVE

## for your diesel!

Here is how the application of AiResearch Turbochargers can affect the performance of your mobile or stationary diesel equipment:

✶ Adds more power in relation to size and weight than any other units in this field.

✶ Decreases fuel consumption. Besides decreasing costs, this factor greatly increases the non-refueling range for mobile equipment.

✶ Provides power as needed by responding rapidly to acceleration requirements. This factor greatly decreases smoking.

✶ Maintains sea-level power under all altitude conditions.

✶ Greatly reduces the noise level of your equipment while eliminating power-wasting mufflers.

AiResearch is the largest producer of small turbomachinery in the United States. Twenty-five *million* hours of experience in deriving exceptional power from small units is the background for the development of the AiResearch Turbocharger. This power package was recently applied to earth-moving diesel equipment with startlingly effective results.

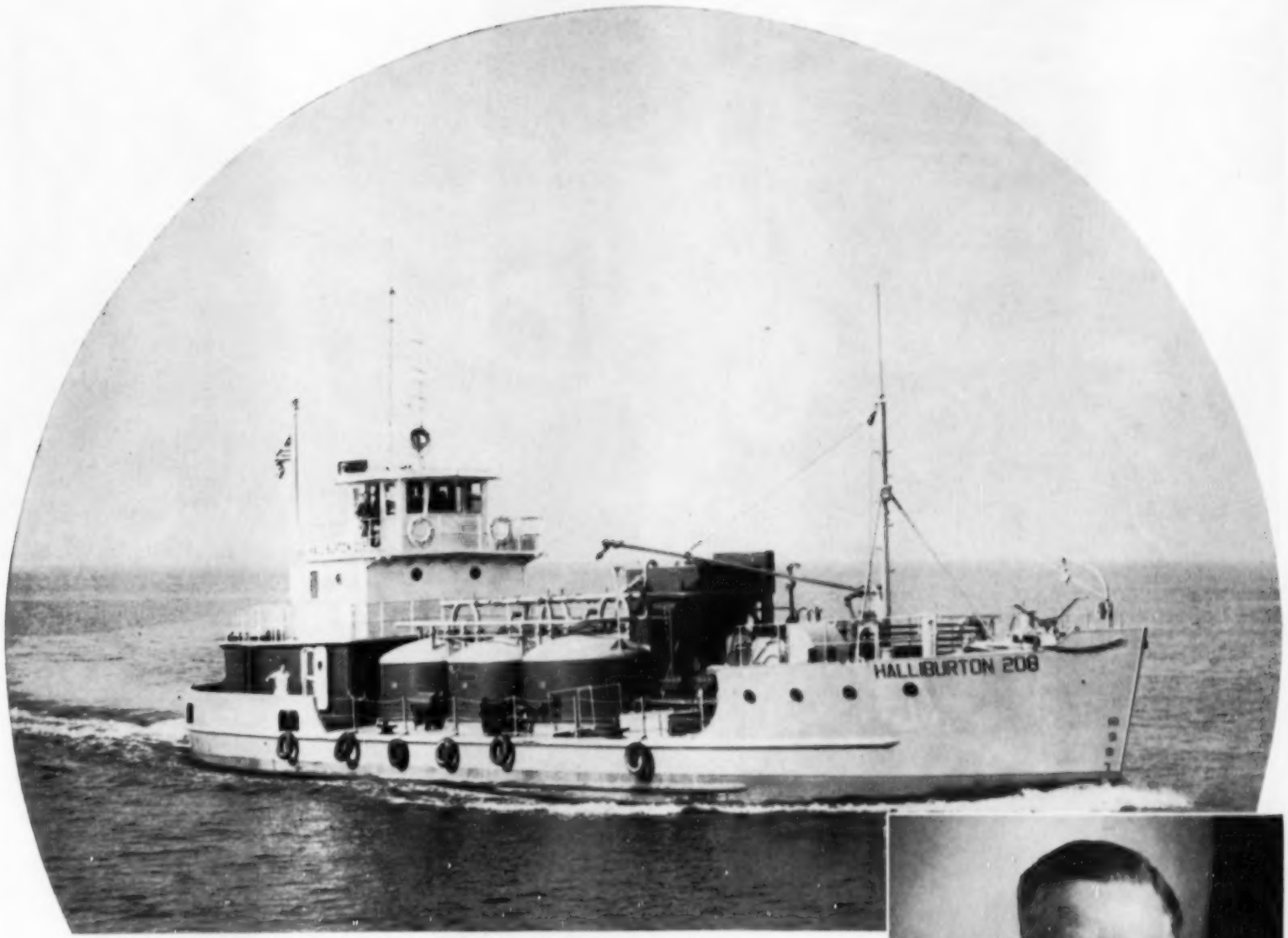
Your inquiries are invited.

THE GARRETT CORPORATION

AiResearch Industrial Division

*9225 Aviation Blvd., Los Angeles 45, California*

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND RELATED MACHINERY




This is the world's third ocean-going cementing ship, a sister of the first two—*Halliburton 206* and *Halliburton 207*. All three are propelled by twin Caterpillar diesels. They have Cat diesel-electric units and Cummins diesels on their three Halliburton T-10 pumps.

Erle P. Halliburton, founder of the Halliburton Oil Well Cementing Co. and a variety of other well-known industries, has advocated mechanization of work throughout his career.

# HALLIBURTON SERVES BY LAND AND SEA

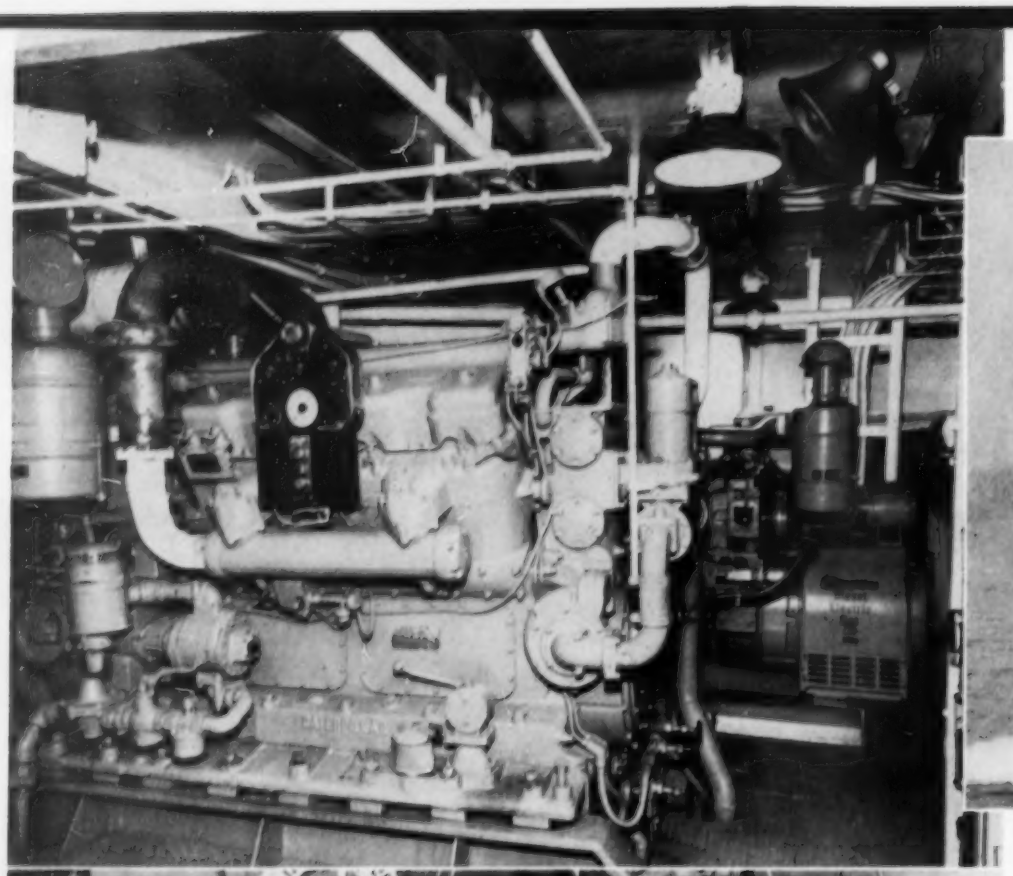
*By* MARK OGDEN

SERVING the petroleum industry, wherever it drills for oil and gas, is the somewhat complicated job created for itself by the Halliburton Oil Well Cementing Co., Duncan, Okla. Deep, sticky mud was among the major handicaps overcome by Erle P. Halliburton when he founded this far-flung company back in 1924. Today, mud is still encountered by his colleagues—though not to the extent it was in the early days—but, in addition, great distances, high elevations, and storms at sea are barriers that are overcome.

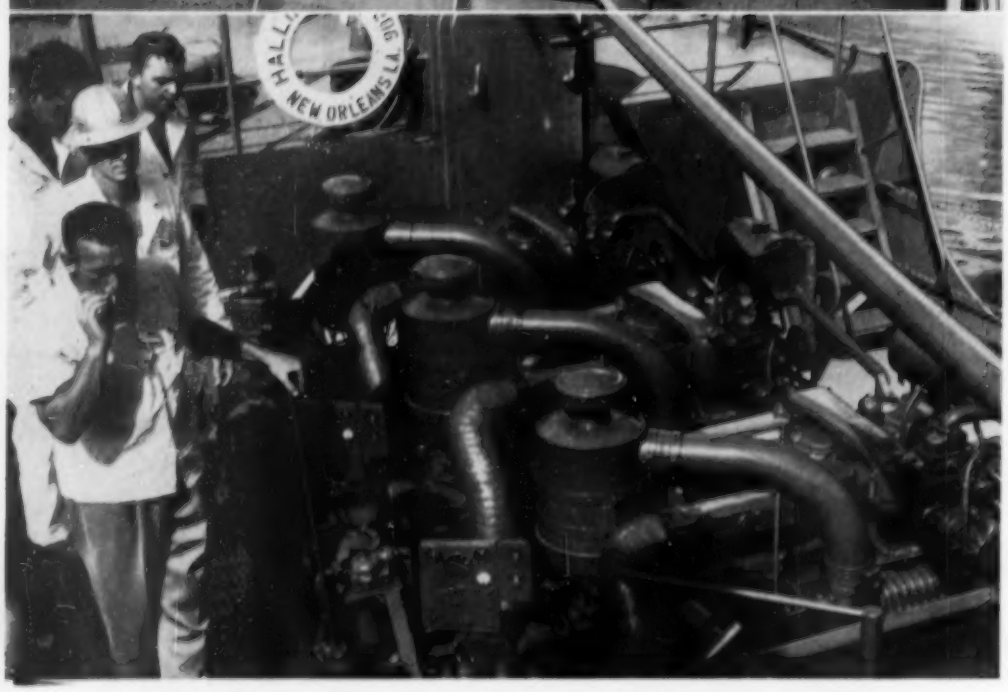
At the outset, Mr. Halliburton single-handedly served a few skeptical customers in the Mid-Continent area. Today, Halliburton trucks may drive 700 miles to accommodate a driller. They may climb the side of a high, remote mountain. Shallow draft vessels attend to the needs of drillers in the bayous, and an ocean-going fleet is growing to reach the offshore rigs. A total of 8283 Halliburton employees work in 22 states and 15 countries.

It is not surprising to find thousands of diesel engines of various types also employed in the services that Halliburton renders. They are well suited to the rugged duties they are called upon to perform; they provide reliable, economical and flexible power. Furthermore, diesels implement the doctrine of mechanization that Erle P. Halliburton has preached without pause from the beginning of his career. In his occasional addresses, he has stated this doctrine: "Our fond recollections to the contrary, there were no good old days. Those days were filled with back-breaking labor—the kind that aged men before their time. But thank God that American genius has given us the marvelous machines with which we now work and play."

Mr. Halliburton is as versatile as the diesel engines his company owns and operates. For example, he formed one of the pioneer airlines of the Southwest, later merged with American Airlines. He manufactures cement from oyster shells at Corpus Christi and luggage from aluminum at Los Angeles. In the oil fields, cementing was the original—and is still the heavy volume—service offered by Howco. Other services have been added. They include formation testing, providing special tools



**One of the two Caterpillar D375 propulsion engines aboard the *Halliburton 208*. In the background can be seen one of the two Cat D318 generator sets for auxiliary power. All five of Halliburton's sea-going cement service ships are fitted out thus.**




**The photograph above was taken on the *Halliburton 206* and shows the three Cummins diesels on deck. Each powers a T-10 Howco pump used for transferring cement slurry to offshore drilling rigs. On the newer *208*, one of the battery of three Cummins pumping engines is located below deck, as shown in the picture below. These engines drive through Allison torque converters and are equipped with Ross heat exchangers, Cuno fuel filters, and Fram lube oil filters.**

for specialized work, electrical well servicing, delivery of bulk cement, consultation on production techniques, and, developed within the last few years, six types of fracturing.

The advent of offshore drilling in the Gulf of Mexico led Howco in 1953 to start a sea-going fleet. Previously, when drilling was done in the bayous, regular cementing trucks were driven onto barges and towed by tugs to the drilling rigs. In 1947, several LCTs (Landing Craft, Tanks) were acquired from the government and converted for cementing duty. They served satisfactorily in protected waters but were not deemed seaworthy in open waters. Therefore, when the rigs departed from shallow waters and set up for business far out in the Gulf, Halliburton met the challenge with two developments. One method was to install skid cementing units permanently on the drilling platforms, supplying them with bulk materials from barges. The other method was to provide self-propelled cementing ships—the *Halliburton 206* through *210*—sufficiently seaworthy to reach the drilling platforms in all but the severest storms, and capable of standing by while performing their cementing function. In most cases, the skid units provide enough power and capacity to serve a rig, but the self-propelled cementing ships can supplement their work and also are available in case of fires, blow-outs and other emergencies.

Since the *208* is typical of the sea-going Halliburton fleet, we will describe it. For all practical purposes, the sister ships may be called identical. Length is 124 ft., beam, 31½ ft., loaded draft, 7 ft. 8 in. The *208* has a modified V-bottom hull. Each of the twin screws is driven by a 270-hp, 8-cylinder Caterpillar marine diesel operating through a Snow-Nabstedt 3-to-1 reverse reduction gear. The Columbian bronze propellers are 52 in.

**Built by the Equitable Equipment Co., Inc., the *Halliburton 208* is 124 ft. long, 31½ ft. of beam, and has a loaded draft of 7 ft. 8 in. Twin screws are turned by 270-hp diesels, operating through Snow-Nabstedt 3-to-1 reverse reduction gears. Eight cone-shaped tanks handle the cementing materials. Air-conditioned quarters are provided for a 7-man crew.**

in diameter with 41-in. pitch, changed to 46-in. in later ships. Maximum speed is 10 knots. As this was written, the *209* and *210* were not yet in service. They were built in the New Orleans shipyard of Higgins, Inc., and were launched in August.

The engine room also contains two 6-cylinder Caterpillar D318 40-kw generator sets. Besides furnishing auxiliary power, these diesels drive high-volume, low-pressure air compressors, one a Quincy and another a Davey. The switchboard panel was built by Pelham Electric Mfg. Co. The lube oil alarm system is by Penn Control, Inc. The bilge pump is a Fairbanks-Morse.

Three Model NHRBS-600 Cummins diesels are on each of the vessels. On the *206* and *207* these engines are on deck. On the others, two are on deck and the third is in the forward hold. Engine jacket water for the Cummins diesels is keel-cooled. Lube oil is cooled in a Ross heat exchanger. Filters are Cuno for fuel and Fram for lube oil. No silencers are used.

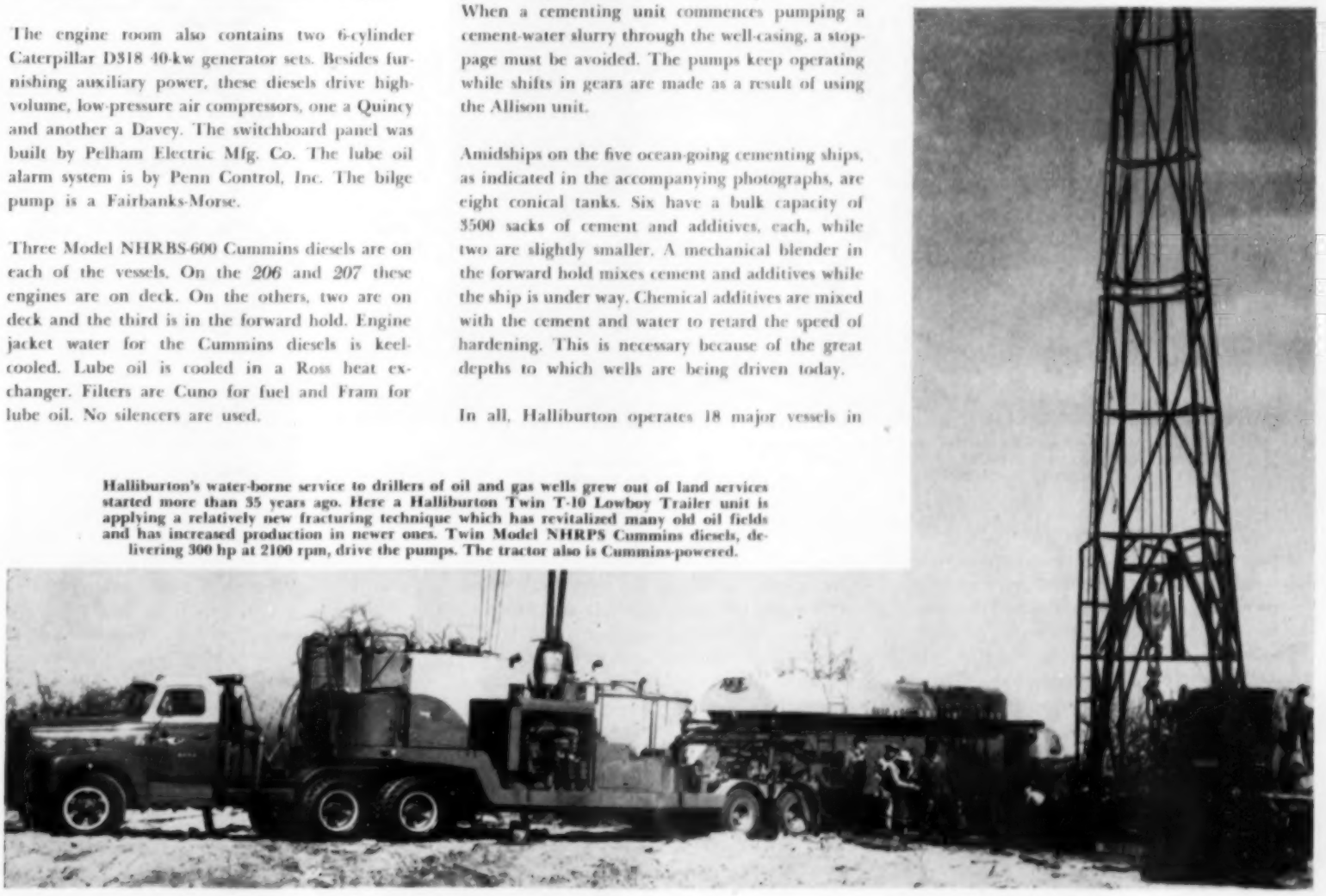
Each of these 300-hp diesels is connected to a Halliburton T-10 cementing service pump by an Allison Torqmatic combination transmission and converter. These Torqmatics, incidentally, have proved highly beneficial in this type of service. When a cementing unit commences pumping a cement-water slurry through the well-casing, a stoppage must be avoided. The pumps keep operating while shifts in gears are made as a result of using the Allison unit.

Amidships on the five ocean-going cementing ships, as indicated in the accompanying photographs, are eight conical tanks. Six have a bulk capacity of 3500 sacks of cement and additives, each, while two are slightly smaller. A mechanical blender in the forward hold mixes cement and additives while the ship is under way. Chemical additives are mixed with the cement and water to retard the speed of hardening. This is necessary because of the great depths to which wells are being driven today.

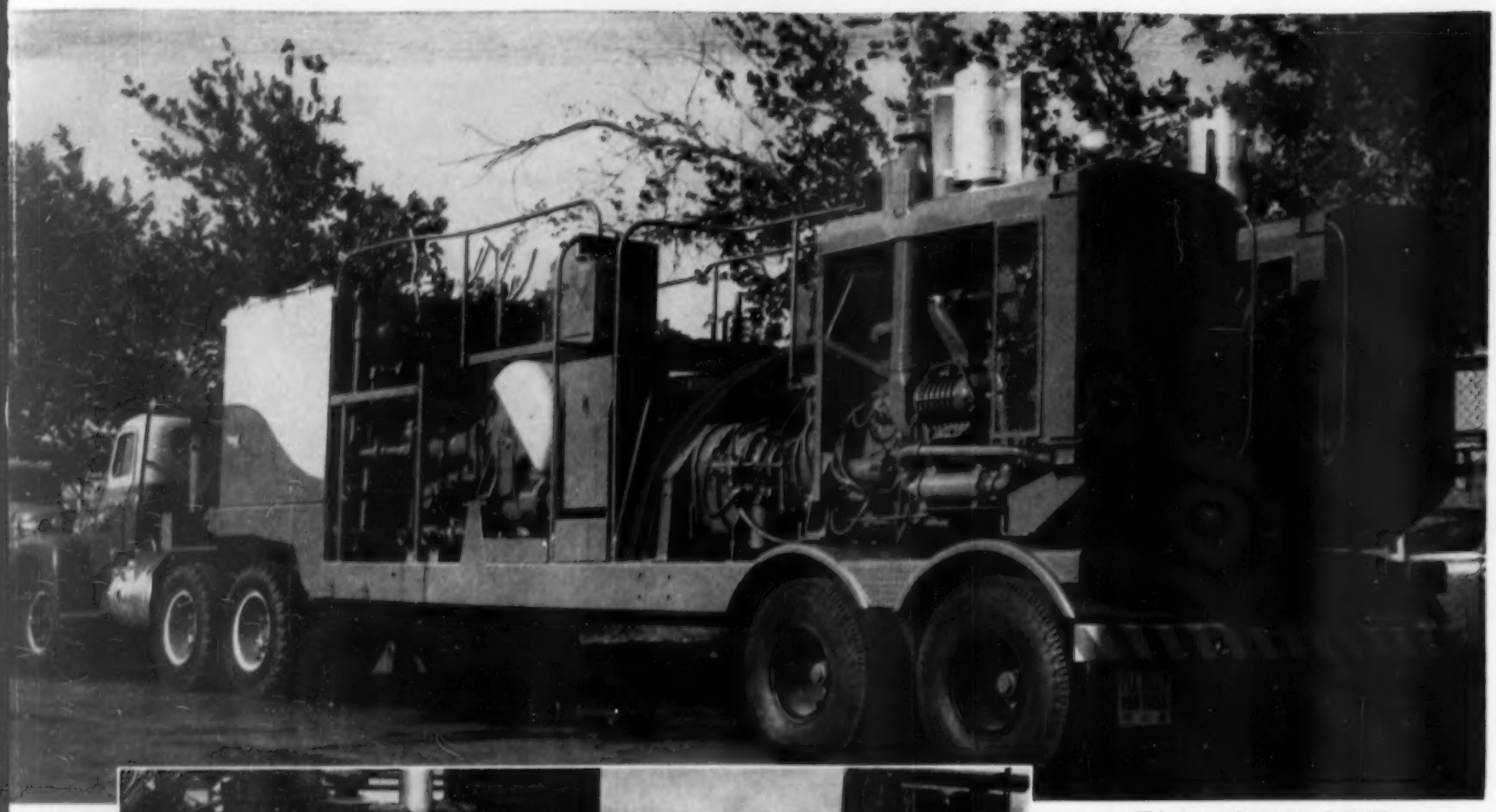
In all, Halliburton operates 18 major vessels in the Gulf, plus many smaller boats used for crew changes and transportation of supplies. Besides the five ships described above, five of the fleet are self-propelled, converted LCTs, numbered *201* through *205*. There are four non-self-propelled barges used to deliver bulk cement, numbered *101* through *104*. Two barges, the *401* and *402*, can perform all cementing service but must be towed to location. The barge *403* is equipped to perform all types of electrical well servicing instead of doing cementing. A South American subsidiary of Halliburton also operates a cementing vessel on Lake Maracaibo in Venezuela.

"Cementing" provides a sheath of cement between the open hole and the pipe, or casing. This is accomplished by pumping fluid cement down the inside of the casing under such pressure that it will be forced from the bottom up the outside of the pipe. This cement sheath serves several useful purposes. Four of them will be merely mentioned here. The sheath absorbs some of the stress placed on the casing, thus prolonging the life of the pipe. In soft strata, cementing prevents caving in to lower levels where drilling is in progress. It seals off fresh water seams so the water will not be contaminated by salt water or by oil, and so oil or gas will not be diluted with the water. And the sheath reduces the possibilities of blowouts.

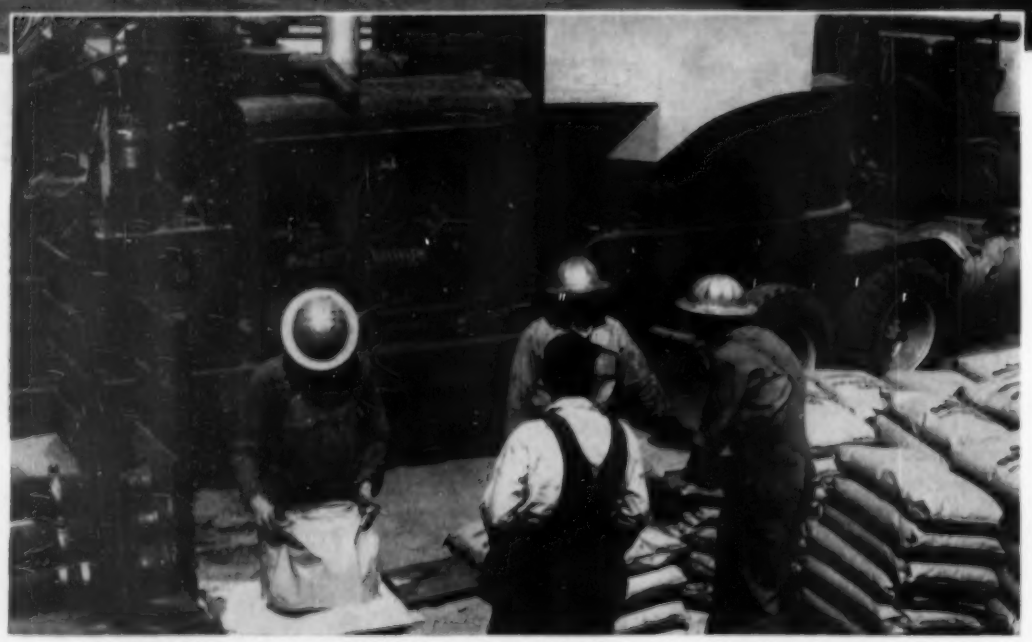
"Fracturing" is the latest of the services added to the Halliburton list. The objective of this process is to create new flow channels and enlarge exist-



**Halliburton's water-borne service to drillers of oil and gas wells grew out of land services started more than 35 years ago. Here a Halliburton Twin T-10 Lowboy Trailer unit is applying a relatively new fracturing technique which has revitalized many old oil fields and has increased production in newer ones. Twin Model NHRPS Cummins diesels, delivering 300 hp at 2100 rpm, drive the pumps. The tractor also is Cummins-powered.**



This is another type of Halliburton dieselized cement pumping trailer. The 300-hp Cummins engines drive Howco T-10 pumps through Allison's Torqmatic transmission and converter combination.



Workmen are shown opening sacks of sand which is being fed into a Howco mixing unit, the compound to be used in one of six fracturing treatments the Halliburton organization offers its many customers. A pair of Cummins diesels can be seen in background, mounted on a lowboy.

ing channels in oil and gas bearing formations so that production can be restored on abandoned fields or increased in producing fields. The channels are created or enlarged by pumping sand-bearing fluids into the formations. The sand then holds the tiny channels open. The combination of fluids and the amounts of sand needed vary. Halliburton offers six fracturing techniques. Hydrafrac (Reg. U.S. Pat. Ofc.) is the original one. Sandoil is the method most in demand at this time. The others offered by Halliburton are Acidfrac, Emulsifrac, Waterfrac and Vis-O-Frac.

It was soon found that effective fracturing requires even greater pressures, and therefore more horsepower, than cementing. To meet this demand and keep within highway weight and length restrictions, the Halliburton Twin T-10 Lowboy Trailer was designed and built. A special low-bed, drop-frame trailer was designed. Cummins Sales & Service, Inc. engineered a power unit to mount on the trailer. The unit consists of twin Model NHRPS-600 Cummins diesels, rated at 300 hp each. They are connected through Allison Torqmatics to Howco T-10 pumps.

The Torqmatics are single-stage hydraulic torque converters which drive through full-power-shift, planetary-type transmissions. It is reported that more than 200 Torqmatics are in use today on the fracturing units operated by various companies. This drive system is popular because it gives maximum flexibility, ease of operation, and absorption of shock loads.

The total weight of the tractor-trailer combination is 55,760 pounds and the length of the train is 45 ft. International trucks, powered by Cummins diesels, transport the fracturing plants. The 5700-lb. pumps, working together, have a capacity of 80 gpm at 9000 psi or 760 gpm at 1000 psi.

This cursory discussion of just two of the services offered by Halliburton – plus brief mention of essential dieselized equipment used in the operation – is sufficient, we believe, to indicate the magnitude and caliber of Howco. It all started with a few sound ideas that were rejected. Erle P. Halliburton, as a young man, worked for a pioneer oil well cementing contractor. To him he proposed some improvements in methods and equipment.

Mr. Halliburton's suggestions were ignored, so he severed his connection, went to the Mid-Continent fields and started his own business. He found progress difficult at first because drillers considered it a waste of time and money to pump valuable cement around a well casing. Recognition came, however, in 1920, when Mr. Halliburton cemented and killed a wild well for the Skelly Oil Co. Thereafter his business prospered. In 1924, with 60 employees, he incorporated the international firm of which he is today the chairman.

Pulling a plow is but one of many uses to which dieselized equipment is put by California rice farmers. This Allis-Chalmers HD-10 is owned by a second generation Chinese, Fong Shew Ming, whose mechanized operations are a far-cry from the methods still used after many centuries in China.

# RICE FARMERS RELY ON DIESELS

*By* F. HAL HIGGINS

RICE growers in California's Sacramento Valley are attacking present-day problems in the cooperative, intelligent way they have formulated during the last 90 years. In those years, they progressed from horses to steam and to gasoline power before turning, logically, to diesels—starting 24 years ago. The first agricultural diesel tractor sold went into this fertile valley.

Something new has been added to rice growing, however, the writer discovered recently when he attended the annual Rice Day at the Biggs Rice Station. Joint participants in the event were personnel from the University of California, the U.S. Department of Agriculture, and the local rice farm-

It is expected that rice farmers will turn to drilling of seed and fertilizer instead of spraying it from airplanes. In the Soil Conservation Service photo below, an Oregon wheat rancher is using a Cat tractor to drill seed. Transplanting this method to rice farming will create new jobs for diesel-driven crawler tractors.

ers. They sought the newest answers to a variety of problems such as irrigation, fertilizers, warming basins for cold irrigation water, weed control, drying and storage of crops, and rotation of crops.

Of importance to the diesel industry was the advocacy of a new job in the rice fields for crawler tractors, Dr. D. S. Mikkelsen, of the Biggs Station, aided by impressive graphs, showed that an increase of 30 to 40% in yield can be obtained by drilling nitrogen fertilizer into the fields instead of spreading it from planes over the water-covered fields. Airplane application of fertilizers is a practice introduced during World War II which spread rapidly over the rice map.

Seeding rice fields by plane was introduced in California more than 25 years ago, but it now appears likely that dieselized tractors will edge airplanes out of the picture entirely. Tractors may be used for both seeding and the spreading of fertilizer. It will be interesting to watch the battle for business among full-line dealers.

Other work for crawler tractors equipped with bulldozers is provided in the rice country by the coldness of the water used in irrigation. At the head of the great Central Valley, Shasta Dam impounds waters drained from the snowfields of the Cascade and Sierra ranges. The water then flows down the Sacramento and enters the irrigation canals, still too cold for rice. This trouble is overcome by individual farmers who scoop out warming basins at the upper edge of their rice fields.

The water is held therein until it rises 10° or more in temperature. Japanese rice scientists have been consulted on this problem, and much has been learned as to pond depth, weed control, etc., from the experimental basins at the Biggs Station. This job of 'dozing basins is an easy one with the powerful diesel tractors now found on nearly every farm in the valley.

Unless a person actually sees a Sacramento Valley rice harvest, an account such as this is hard to believe. Go into the fields in October and November and you will see, for example, brightly painted field service units of all the leading oil companies—Standard of California, Shell, Union, General Petroleum, Richfield and Texaco. Fuel and lubricant accounts with some of the biggest rice growers will run between $3500 and $5000 a month, and you can be assured these accounts are given top service.

Dealers who sell dieselized equipment also are setup to give fast emergency service. Landing fields are maintained near equipment stores at Robbins, Marysville, Yuba City, Colusa, Willows and Woodland. And many of the planes that land, by day and night, are flown by the farmers themselves. Rice farmers are said to be the flyingest farmers.

Like other types of specialized farming that has gotten into the big business class, rice growing has had specialized equipment designed and built for it. The most impressive in the rice country is a self-propelled combine. Very big and powered by two diesels each, these units can be operated by one man. There are more than 60 of them.

The rice combine was developed on the Heidrick Brothers farm, west of Woodland. In an early version, they used a gasoline engine. Then they bought a pair of 60-hp GM diesels and set them on top of their big Case thresher. Old Cat Sixty tracks were put under the machine, and a big bin was mounted on top. It was not until the wet 1945 harvest that the machine won recognition.

California growers suffered a 15% loss in 1945 because their rice was discolored and therefore downgraded due to the soaking of the crop when down.

In 1946, all the growers with big acreage wanted a copy of the Heidrick machine that was "bigger than the weather." Kaiser's shipyard at Richmond built one of these machines from scratch for the Heidricks. The Capital Machine Shop in Sacramento built several for various growers. Then Hahn & Mehrten in Stockton took over from the Heidricks the building of the machines as fast as they were ordered.

Today, some of the leading growers have fleets of three or four of these Heidrick-type harvesters.

**Tractors such as this TD24 from International's "Big Red" line are called upon for an increasing number of chores on California's big rice farms. This one belongs to Terrill Sartain who used bulldozers to clear and level the land that enabled him to become a leading California rice grower. Bulldozers also are used to scoop out warming basins and to make harvest roads across the fields.**

**Rice growers have been informed they can increase their yield up to 40% if they will apply fertilizer by drilling instead of by airplane spraying. The photo below, supplied by Associated Farm Service, Stockton, shows the equipment and method used in applying liquid fertilizer in an asparagus field. Rice growers are expected to follow this pattern. The tractor shown is an International TD6.**

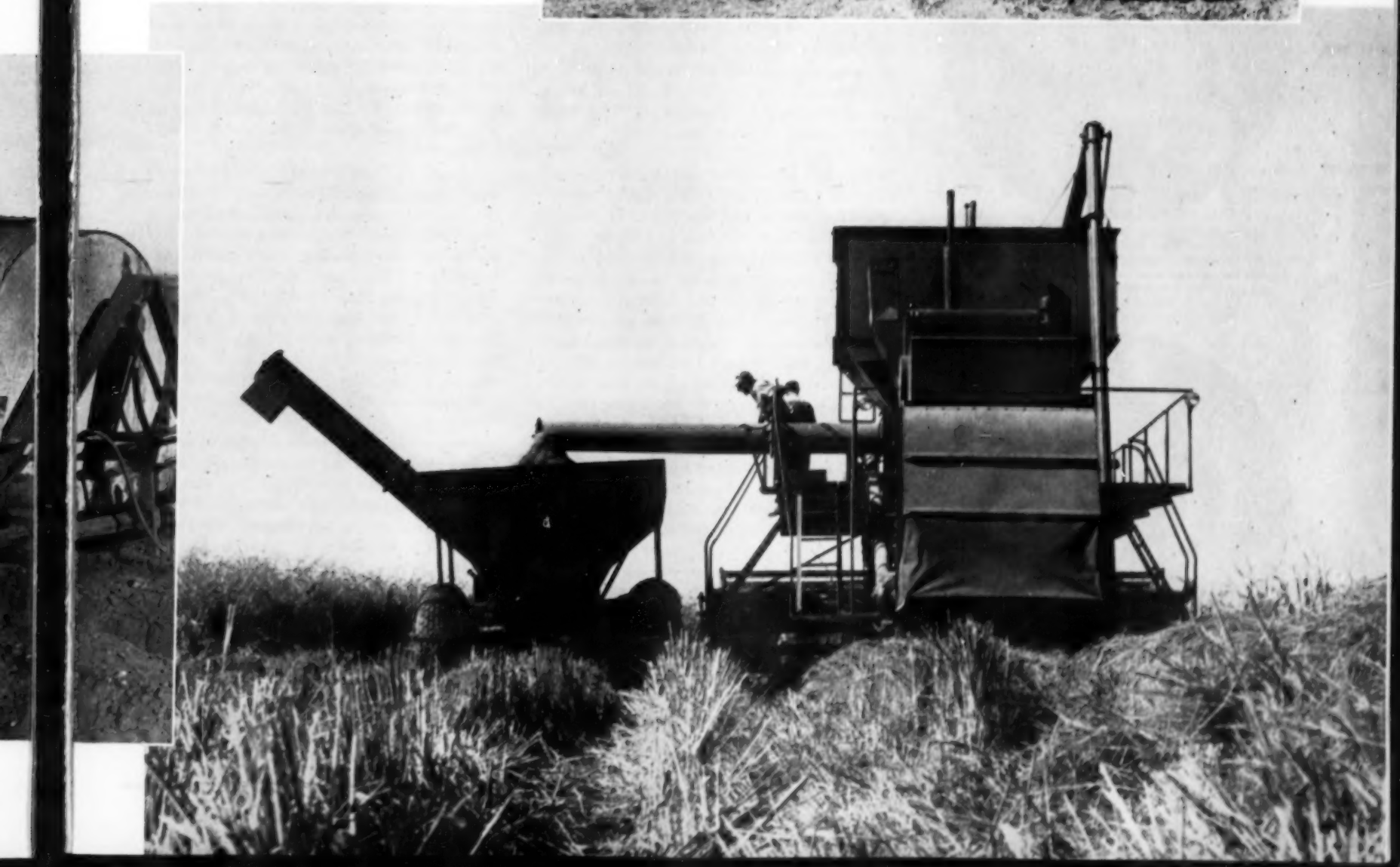
**Land levelling is a standard operation on California fields being prepared for irrigation. In the above photo, the land plane is being pulled by an International TD14 tractor.**

And the Heidricks also designed and built a self-propelled "bank-out rig" that goes from the edge of the field to take off a bin of rice when the combine operator signals he has a load. The diesel trucks that haul the grain to mills can't negotiate the wet rice fields.

Such machines, such service, and such self-reliant farmers are taken for granted in the California rice belt. But all these are amazing to the point of disbelief to an outsider who comes into the valley without a proper indoctrination.

**On still another rice farm, an International TD18A is being given a quick hitch to a disk suited for the heavy adobe soil. These tractors also pull gang plows, drills, and other farm equipment as needs dictate.**

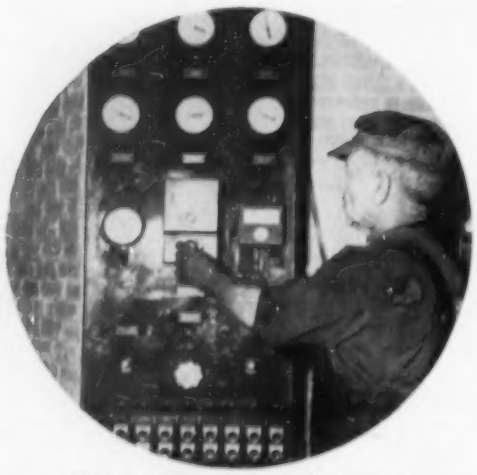
**More than 60 of these rice harvesters are used in the Sacramento Valley. Powered by two diesel engines, they are self-propelled and one man can operate a combine. Alongside is a specially designed "bank-out" rig to transfer grain from the harvester to trucks at the edge of the field.**



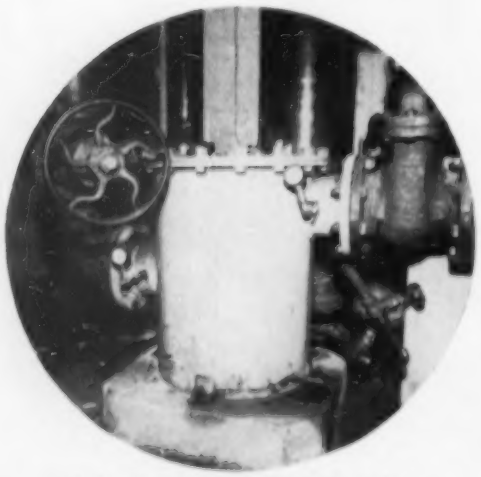
# CEDARBURG, WISCONSIN

## Dual-Fuel Engine Cuts Production Costs 35% At Power Plant Where Gas Costs 55c Per MCF: Fairbanks-Morse Installation Increased Capacity to 3400 KW

Pritchard induced draft cooling tower, installed with F-M engine, handles entire plant. Also shown is Burgess-Manning exhaust snubber serving the new engine.



Operator John Buth checks exhaust temperatures with the Alnor pyrometer mounted on the Marquette Electric gauge and alarm panel. Latter includes a Marshalltown gauge and a Midget Levelometer.



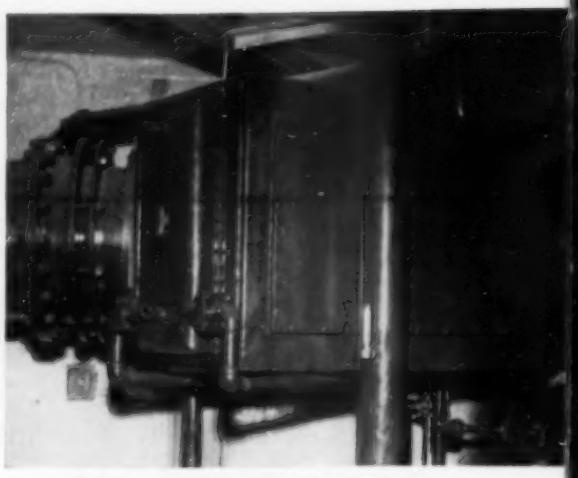
Lube for the big dual-fuel engine passes through this Air-Maze full-flow filter, protecting aluminum bearings.

IN 54 years of operation, the municipal power plant at Cedarburg, Wisc., has drawn upon four principal sources of power, including a steam plant, oil-burning diesels, purchased power and dual-fuel engines. The objective of this "shopping" was to supply consumers with the most economical and dependable service possible. Steam was the source of power from 1901 to 1926. The first diesel engine was installed in 1926 and the first outside power was purchased in 1944.

In 1952 and the spring of '53, diesel production costs, including fuel oil, lube oil and station labor, were averaging 11.9 mills per kw/hr and the cost of purchased power had reached an average of 13.5 mills per kw/hr. In July, 1953, to meet this situation, the plant put into service its first dual-fuel engine. The effect on operating economy was immediate and striking. Producing more than 87% of the plant's total generation during the next 15 months, Cedarburg's new 2800-hp Fairbanks-Morse dual-fuel engine cut production costs by more than 35%, from 11.9 mills per kw/hr, the average for the oil-burning engines in 1952, to 7.69 mills per kw/hr for the dual-fuel unit in the period July, 1953, through September, 1954. These cost savings were achieved despite a premium price of 55 cents per thousand cu. ft. paid for natural gas.

In the past six years, the load at the Cedarburg plant has doubled, rising from a peak of 1600 kw in 1949 to 3200 kw last year. To meet these increased demands, the city had been forced to augment the limited capacity of its power plant by purchasing progressively greater amounts of power, at rates which reflected the increasing demand charges. The capacity of the plant prior to 1953 was 1400 kw, supplied by three Nordberg diesels installed in 1926, 1928 and 1937, respectively. This capacity was outstripped for the first time in 1944 when peaks reached 1450 kw, forcing the plant to purchase 901,044 kw/hrs out of an annual volume of 5,340,944 kw/hrs. By 1952, the plant's peak had reached 2600 kw and almost half of the city's total annual volume had to be purchased. In that year, immediately preceding the installation of the new unit, a total of 4,598,538 kw/hrs out of a volume of 10,250,738 kw/hrs was purchased. This represented 44%, purchased at an average rate of 13.5 mills per kw/hr.

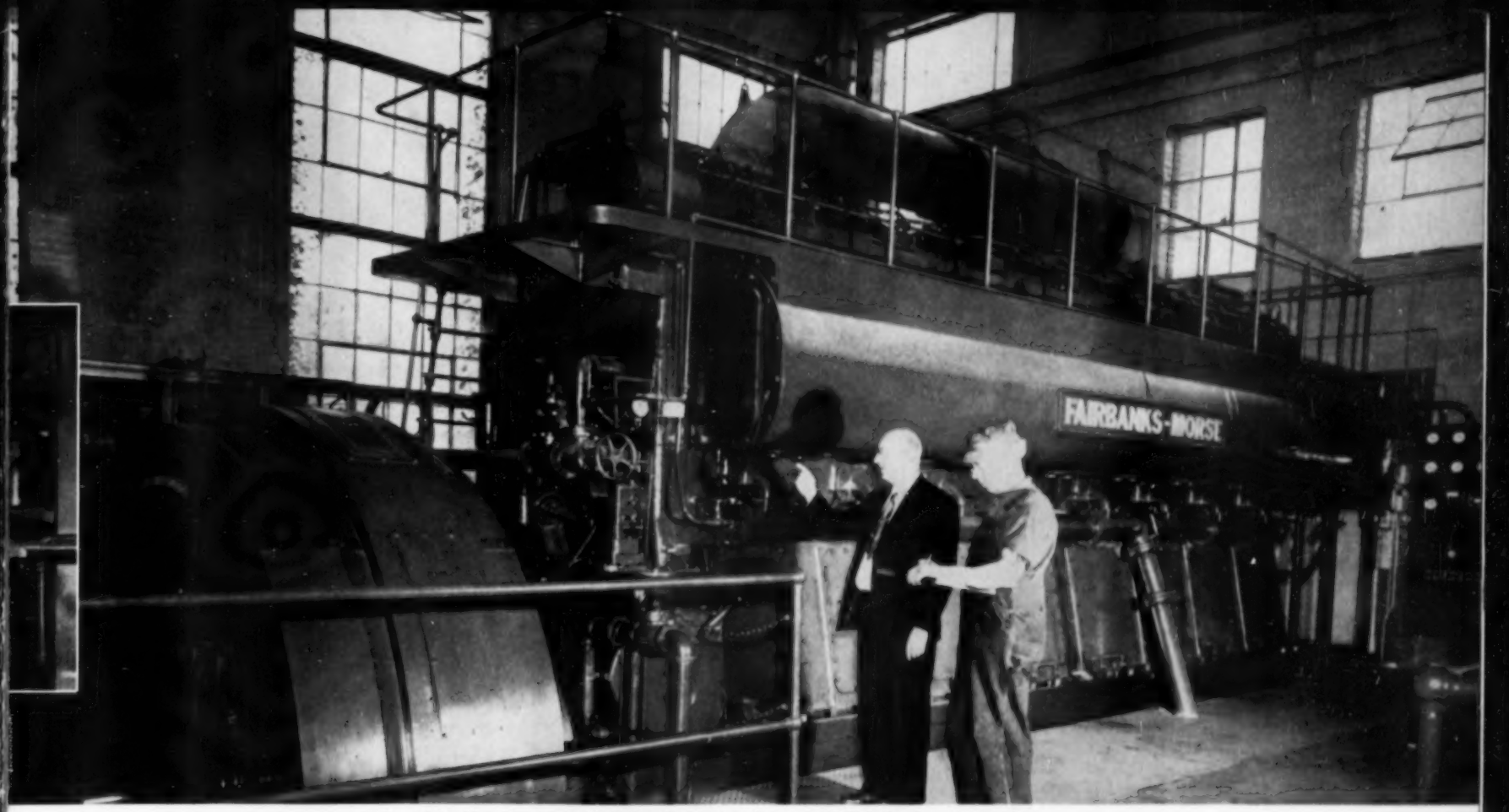
The installation of the dual-fuel engine increased the plant's generating capacity by 2000 kw, from 1400 kw to 3400 kw. The result was an immediate reversal in the trend toward more and more purchased power. Despite an increase in peak load of 600 kw between 1952 and 1954, the proportion of purchased power to total volume decreased to 35% during the engine's first 15 months of service. The new engine produced 9,324,000 kw/hrs during this period; the three oil engines produced 1,367,560 kw/hrs, and a total of 5,840,700 kw/hrs was purchased. The result has been a saving to the plant of approximately $44,500 based on the assumption that the new engine's production replaced 3,691,000 kw/hrs of purchased power at the current average of 13.5 mills and 5,633,000 kw/hrs of oil engine generation at the 1952 cost of 11.9 mills.



Engine air for the new F-M engine passes from the motor-driven blower through this Kewanee-Ross aftercooler to the intake header.

The Cedarburg plant is located in a growing community approximately 20 miles north of Milwaukee. Due to an expanding industry and to an influx of commuters from Milwaukee, the town's population has been increasing rapidly over the past few years and has topped 3000. At present, the municipal power plant serves an outboard motor manufacturer, two aluminum foundries, a die casting factory, an electric motor manufacturer, a wool mill, three woodworking plants and a cannery, which is in operation for 10 months of the year. Under construction is a new lens plant.

To accommodate this increased industrial activity as well as an accelerated home building program, the town recently incorporated 300 additional acres in outlying districts. In 1940 the power plant's peak load was 600 kw. In 1950 it was 1800 kw and in 1955 it is expected to reach 3600 kw. In addition to industrial expansion, municipal officials trace this growth to the use of more electric appliances in the home, including air conditioning. Impetus is given to the use of such appliances by the low rate schedule offered by the power plant. There are 500 water heaters in town and a large number of electric stoves, all of which are on a one-meter system.




**Palmer Schneider, Manager of Utilities, discusses performance of Cedarburg's newest and largest engine with Operator John Buth. The 8-cylinder, Model 31AD18 Fairbanks-Morse engine is rated 2800 hp at 227 rpm. It has a Woodward UG-32 governor.**

When demand took a sharp upward turn during the war years, outstripping the plant's generating capacity, there was little the town could do but purchase power. New generating equipment was almost impossible to get. At the end of the war, from 1946 to 1952, peak loads increased at the rate of about 100 kw per year and the town continued to purchase power in increasing quantities. In 1952, however, peaks suddenly spurted from 1800 kw to 2600 kw, an increase of 44% in a single year. It was then that the expansion program was formulated that produced the new engine.

The engine selected was an 8-cylinder, 18-in. by 27-in. Fairbanks-Morse Model 31AD18 dual-fuel unit, rated at 2800 hp at 277 rpm and driving a direct-connected 2500 kva, 2000 kw, 3-phase, 60-cycle, 4160-volt alternator with 25-kw V-belted exciter. It was erected in space provided at the time the 700 kw unit was installed in 1937 and was placed on the line in July, 1953. During the next 15 months, this heavy-duty dual-fuel engine produced a total of 9,324,000 kw/hrs, while consuming 67,712 gals. of pilot oil and 100,368.8 mcf of natural gas. Average gas consumption was 10.76 cu. ft. per kw/hr, and average pilot oil consumption was 0.00726 gals. per kw/hr. At a higher heating value of 980 btu. per cu. ft. of gas and 137,000 btu. per gal. of pilot oil, these averages reflect a thermal efficiency of 11,543 btu. per kw/hr, 10,549 btu. of gas and 948 btu. of oil. The 15-month production figures for the dual-fuel engine reflect a total fuel cost, including gas and oil, of $62,512.04 and a total production cost of $71,751.25. Average fuel cost for the period, with gas at 55¢ per mcf and oil at .115 per gal., was 6.69 mills per kw/hr and average production cost 7.69 mills per kw/hr. Within a month after going on the line, the dual-fuel engine was designated as the plant's base load unit and was carrying the bulk of the load. It generally runs six days a week from 6:30 am. to 11:30 pm., according to Palmer Schneider, Manager of Utilities for the City of Cedarburg, who has been highly pleased with the installation.

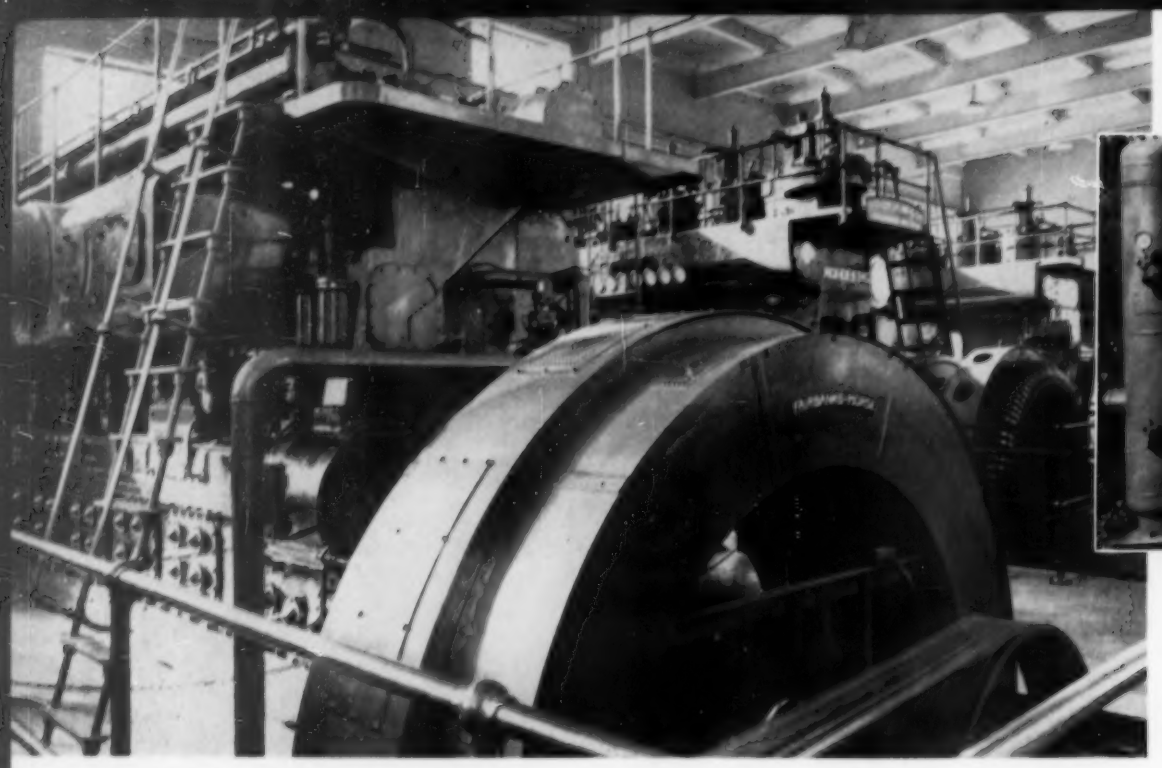
Natural gas arrives at the Cedarburg plant at a pressure of 5 psig. and is compressed to 25 psig. before reaching the engine. Upon arrival it passes first through a recording meter and then through a pressure regulator and a cleaner. The compressor is of the rotary type, rated at 377 cfm. at 865 rpm with a discharge pressure of 25 lbs. It is driven by a 60-hp, line-start induction motor and is equipped with a radiator which cools compressor cooling water in the upper half and gas in the lower half. If gas pressure should fail for any reason, an automatic device on the dual-fuel engine immediately switches the unit over to full oil operation. Should the pilot-oil pressure fail, on the other hand, the engine automatically shuts down, thus preventing gas from collecting in the system.

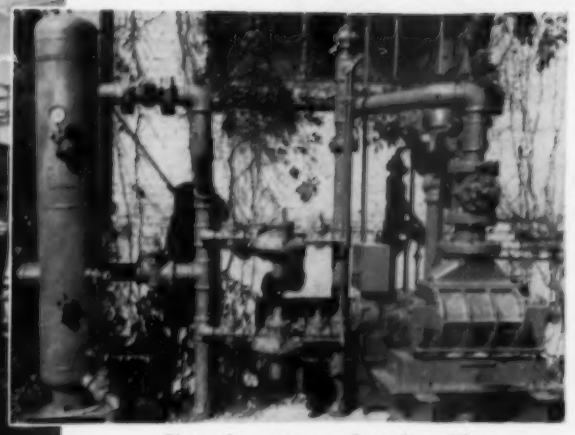
Fuel oil is delivered at the plant by truck and is unloaded by gravity into a 40,000-gal. underground storage tank. It is picked up from storage by a small motor-driven transfer pump and is sent to a 300-gal. day tank. From this tank, also underground, fuel is sent to the injection pump and nozzle at each cylinder by an engine-driven supply pump equipped with a duplex bag-type filter on the pressure side.

Lube oil is circulated under pressure through the engine by a built-in, engine-driven pump, passing

**TABLE I**

| | Kw.Hrs. Generated | | Kw. Hrs. | Pilot Oil | Therms | F-M Engine |
|---|---|---|---|---|---|---|
| 1953 | F-M Engine | Oil Engine | Purchased | F-M Engine | Gas | Lube |
| July | 127,000 | 396,500 | 417,768 | 4,670 | 11,024.5 | 270 |
| August | 355,000 | 227,300 | 456,084 | 2,780 | 39,760.6 | 220 |
| September | 557,000 | 100,400 | 409,116 | 3,525 | 61,148.5 | 450 |
| October | 701,000 | 55,600 | 367,312 | 6,420 | 73,434.8 | 550 |
| November | 615,000 | 81,300 | 417,600 | 3,780 | 65,496.7 | 660 |
| December | 709,000 | 109,900 | 465,600 | 4,745 | 77,045.4 | 345 |
| 1954 | | | | | | |
| January | 578,000 | 180,700 | 388,800 | 3,742 | 63,693.8 | 330 |
| February | 650,000 | 64,300 | 331,200 | 4,060 | 69,696.0 | 440 |
| March | 781,000 | 37,600 | 369,600 | 4,685 | 80,513.0 | 605 |
| April | 755,800 | 14,200 | 333,600 | 5,460 | 77,649.0 | 550 |
| May | 698,000 | 4,000 | 379,200 | 6,145 | 71,853.1 | 495 |
| June | 732,000 | 26,800 | 328,800 | 6,975 | 74,777.9 | 550 |
| July | 713,000 | 20,900 | 374,400 | 4,030 | 76,800.5 | 495 |
| August | 656,000 | 42,100 | 396,000 | 3,670 | 68,347.2 | 550 |
| September | 697,000 | 5,960 | 405,600 | 3,025 | 72,767.0 | 660 |
| TOTALS | 9,324,000 | 1,367,560 | 5,840,700 | 67,712 | 984,008.0 | 7,170 |





Natural gas passes through a Blaw-Knox cleaner, Fisher regulator, and Roots-Connersville meter. Note how the meter is mounted so that it can be rolled out for servicing.

From the generator end can be seen the Nugent fuel filter and the Madison-Kipp cylinder lubricators on the new dual-fuel engine which has taken over the bulk of the load.

successively through a full-flow mechanical filter, thermostatically controlled by-pass valve and cooler. A small motor-driven rotary pump draws a continuous flow of lube from the crankcase, passes it through a cellulose-packed filter, and returns it to the crankcase. When starting and stopping the big engine, a centrifugal before-and-after pump, driven by a 30-hp motor, is used. In cold weather, if the lube oil is stiff, a pressure relief valve by-passes some oil around the pump to avoid overloading. Mr. Schneider reports that the lube oil in this heavy-duty engine is as clean today as it was when the unit was first put on the line. Periodic tests are made by the oil company, the most recent of which revealed no sediment, no water and no dilution. The pressure differential in the mechanical filter, which has never required a cleaning, remains at 45 lbs. inlet and 32 lbs. outlet. The pressure differential in the by-pass filter has increased only slightly, from six to eight lbs.

City water is run through a softener at the plant before addition to the closed jacket water system. It is circulated through the engine by a 5-in. motor-driven centrifugal pump and is cooled in an induced-draft tower which serves the entire plant. One 900-gpm and two 300-gpm motor-driven centrifugal pumps circulate raw water from a sump in the tower, through the lube cooler serving each engine, and back to the tower. A smaller motor-driven pump taps the raw water line and circulates water through the new engine's aftercooler. Jacket water temperature is kept constant by means of an automatic by-pass valve before the cooling tower.

Scavenging air for the dual-fuel engine is drawn through a self-cleaning, oil-bath type filter and is supplied to the cylinders by a 24-in. motor-driven blower housed in a separate chamber. This blower is rated at 13,650 cfm at 3550 rpm, with a discharge pressure of 3.25 psig, and is driven by a 250-hp induction motor. To provide for maximum engine efficiency, air leaving the blower is passed through an air-to-water, fin-tube aftercooler before reaching the cylinders.

Cedarburg has had the advantage of a Schneider to run the power plant for half a century. Ernest E. Schneider was superintendent from 1905 to 1950 and continues to serve in an advisory capacity. His son, Palmer Schneider, joined the plant operating staff 32 years ago and took over management with the title of Manager of Utilities in 1950. The city appreciates the value of experienced personnel. On the plant staff are: John Buth with 32 years of service; August Frank with 23 years; Clarence Fischer with 14 years, and Ben Zimdars with 13 years. The department operates under the supervision of a Utilities Commission with John Sieben as president, Henry Eberhardt as secretary, Theo. Tews, Charles Bradburn and William Herziger.

## TABLE II

| | COST FUEL OIL | | COST LUBE OIL | | COST GAS | LABOR | | COST PER KW. HR. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1953 | F-M | Total Plant | F-M | Total Plant | F-M | F-M | Total Plant | Oil Eng. Diesel | Purchased | F-M |
| July | 517.86 | 5134.13 | 164.70 | 317.27 | 912.12 | ..... | 854.70 | .0141 | .01343 | .01255 |
| August | 306.00 | 2429.12 | 134.20 | 199.94 | 2348.92 | 147.00 | 824.38 | .0122 | .01348 | .00827 |
| September | 400.69 | 1541.37 | 274.50 | 323.21 | 3418.32 | 233.60 | 773.20 | .0136 | .01339 | .00777 |
| October | 877.61 | 1488.59 | 335.50 | 365.92 | 4032.63 | 320.77 | 802.68 | .0137 | .0157 | .00794 |
| November | 429.67 | 1249.26 | 432.60 | 460.87 | 3635.73 | 255.54 | 798.90 | .0123 | .01337 | .00773 |
| December | 539.36 | 1760.17 | 210.45 | 254.21 | 4213.16 | 231.55 | 778.00 | .013 | .01385 | .00732 |
| 1954 | | | | | | | | | | |
| January | 430.03 | 2444.90 | 201.30 | 273.38 | 3545.48 | 184.60 | 837.60 | .0129 | .0149 | .00754 |
| February | 471.65 | 1204.03 | 270.40 | 303.11 | 3854.69 | 311.20 | 822.94 | .0144 | .0146 | .00754 |
| March | 543.26 | 967.28 | 369.05 | 395.01 | 4386.54 | 312.00 | 902.07 | .0146 | .0135 | .00731 |
| April | 634.29 | 792.96 | 330.00 | 342.87 | 4243.34 | 459.71 | 890.57 | .016 | .0148 | .0075 |
| May | 713.86 | 760.33 | 297.00 | 299.55 | 3953.55 | 478.04 | 893.68 | .0177 | .0138 | .0078 |
| June | 801.57 | 1039.47 | 330.00 | 343.67 | 4099.79 | 478.06 | 927.78 | .012 | .01469 | .0078 |
| July | 463.13 | 682.73 | 297.00 | 308.06 | 4200.92 | 567.68 | 1061.37 | .0134 | .0138 | .0078 |
| August | 421.75 | 795.81 | 330.00 | 343.85 | 3778.25 | 373.35 | 870.26 | .021 | .0135 | .0075 |
| September | 347.63 | 684.92 | 396.00 | 408.05 | 3999.24 | 413.46 | 934.81 | ..... | .0133 | .00746 |

## List of Equipment

Engine—Fairbanks-Morse, 2800-hp, 8-cylinder, 18-in. bore, 27-in. stroke, 277 rpm, Model 9HAD18 dual-fuel.
Alternator—2000 kw, 2400/4160 volt, Type TGZO Fairbanks-Morse.
Governor—Woodward.
Air filter—Continental.
Blower—Roots-Connersville.
After cooler and lube cooler—Kewanee Ross.
Gas cleaner—Blaw-Knox.
Gas meter—Roots-Connersville.
Pressure regulators—Fisher Governor.
Gas compressor—Allis-Chalmers.
Gas cooler—Yates-American.
Fuel oil—Socony Mobil.
Fuel meters—Buffalo Meter.
Fuel filter—Nugent.
Fuel level meter—Liquidometer.
Lubricating oil—Gargoyle DTE 4D, Socony Mobil.
Lube filter—Air-Maze.
Lube filter—Hilliard.
Auxiliary lube pump—Roper.
Cylinder lubricators—Madison-Kipp.
Cooling tower—Pritchard.
Thermostatic valves—Powers.
Exhaust snubber—Burgess-Manning.
Thermometers—DPS.
Gauge panel—Marquette Switchboard.
Exhaust pyrometer—Alnor.
Gauges—Marshalltown.
Switchboard—Allis-Chalmers.
Switchboard instruments—Westinghouse.
Battery—Gould.
Starting air compressor—Quincy.

# CLEANING TOOL FOR PISTONS IN DIESEL LOCOMOTIVES

A leading midwestern railroad recently installed a Vapor Blast Liquid Honing Machine in their overhaul shop for the purpose of cleaning locomotive pistons. This new machine has rung up some impressive performance figures compared to previous methods used to clean pistons.

This railroad tried every type of cleaning process in an effort to cut time and labor costs of removing carbon from diesel engine pistons. None of them were successful. The only way was to hand scrape the ring grooves, use fine emery cloth on skirts, and wire brushes on the crowns. This tedious hand operation was a five-man job, four men cleaned the pistons, and a machinist inspected them and wire-brushed the crowns. Their production averaged eight pistons an hour, at a cost of $1.24 per piston. The company was dissatisfied with the quality of the finished job, the excessive labor time involved, and the increasing backlog of work.

Vapor Blast engineers designed a special semi-automatic liquid honing machine, capable of handling either of two sizes of pistons which were standard equipment in their engines. The machine proved highly successful. Pistons are cleaned more thoroughly, more uniformly, and precision tolerances are maintained in ring grooves.

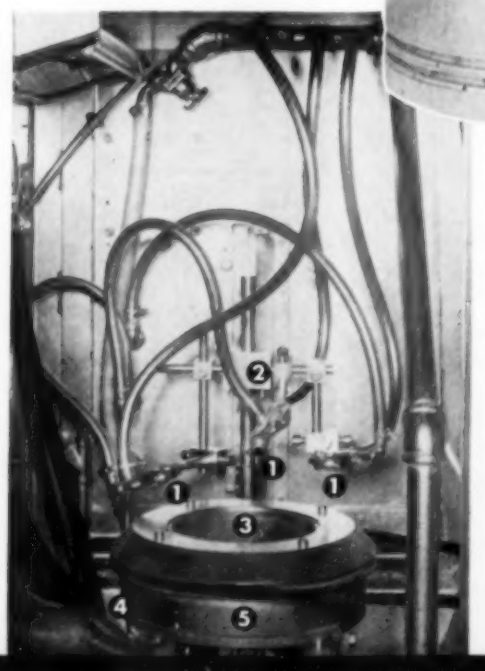
With this machine, one operator turns out seven pistons each hour, cleaning a piston every eight to ten minutes. The cost is only about 25¢ per piston, or a saving of 80% on every piston cleaned over the previous method used. Now the backlog of uncleaned pistons has diminished and the entire operation of cleaning pistons is being done efficiently and with the maximum efficiency in terms of labor time spent on it.

The numbered diagram on this page shows the special mechanism built into a Vapor Blast Liquid Honing Machine for semi-automatically cleaning the carbon from diesel engine pistons. With the piston resting on the rotating device, three VB guns are trained on the piston walls. As the guns are raised and lowered over the face of the piston, automatic controls turn on all three guns as they pass over the ring grooves at the bottom and top of the piston. Two of these guns are turned off, as they finish cleaning the ring grooves, leaving one to completely clean the piston wall. A fourth gun is shown in the center of the holding ring. This moves up and down to thoroughly clean the interior of the piston. A manually operated gun is provided for use in cleaning the piston crown and for any high-spotting that may be necessary.

The entire cleaning operation on a single piston requires only about eight to ten minutes—including loading, automatic cleaning cycle, cleaning the crown, and rinsing. VB 140 QVB abrasive has proved the best for the operation, cleaning thoroughly and maintaining precision ring groove tolerances. No hand scraping or finishing is required.

Piston from a locomotive diesel engine, showing appearance before and after Vapor Blast liquid honing.

VB Type B-20 Liquid Honing Machine, designed for semi-automatic cleaning of diesel pistons. Photo shows two of the three fixed guns which move up and down automatically over the face of the piston as it rotates. Another gun moves inside the piston and a manual gun is for the crown.




Numerals on diagram show: 1. Guns trained to outside of piston; 2. Mechanism for raising and lowering guns over the face of the pistons; 3. Internal gun which moves and cleans inside of piston; 4. Manually-operated gun for high-spotting and cleaning piston crown; 5. Piston holding and rotating device. A special adapter ring can be mounted quickly to handle pistons of smaller size.

# SCHUCK-DESIGNED DIESEL ENGINES

*By* STUART SYMINGTON GOODE

WAYNE L. Shuck, past president of the Independent Garage Owners of Los Angeles, has for many years engaged in engine maintenance and motor analysis. Out of his wide experience in this field several practical inventions have been born that are now in use in the automobile trade. His first ideas for a diesel engine improvement came when he was attached to the First Air Service Regiment in France in World War I. The airplane engine failures and resulting loss of life among our flyers gave point to his thinking towards a better and safer engine. As time went on, Mr. Shuck became increasingly interested in all phases of internal combustion engine development. World War II found him once more performing his specialty, testing military airplane engines. Ideas which had been germinating in his mind came to life in his conception of a 2-cycle diesel with an inner sleeve valve acting as an auxiliary or secondary piston.

Numerous aviation experts encouraged Mr. Shuck and said his ideas were sound. However, experimental work in diesels was ruled out at the time as not rating priority. Only in the last four years has he found sufficient time to build a pilot model of his new diesel. In bringing his proposed diesel engine to the attention of industry through the pages of DIESEL PROGRESS, Mr. Shuck has had the advice of Dr. Vladimir L. Maleev, Professor Emeritus of Mechanical Engineering, Oklahoma Agriculture and Mechanical College and formerly Senior Mechanical Engineer (Diesel) of the United States Naval Academy Engineering Experimental Station. Among others closely associated with Mr. Shuck have been Jess and Stanley Packard, master gear makers of Southern California.

Mr. Shuck has designed an internal-combustion, compression-ignition, two-stroke cycle engine of eight cylinders—two banks of four symmetrically and horizontally opposed. Each cylinder has a single sleeve which functions as a secondary piston. This sleeve-piston also opens and closes both intake and exhaust ports in a unique way. Figure 2 shows the general arrangement.

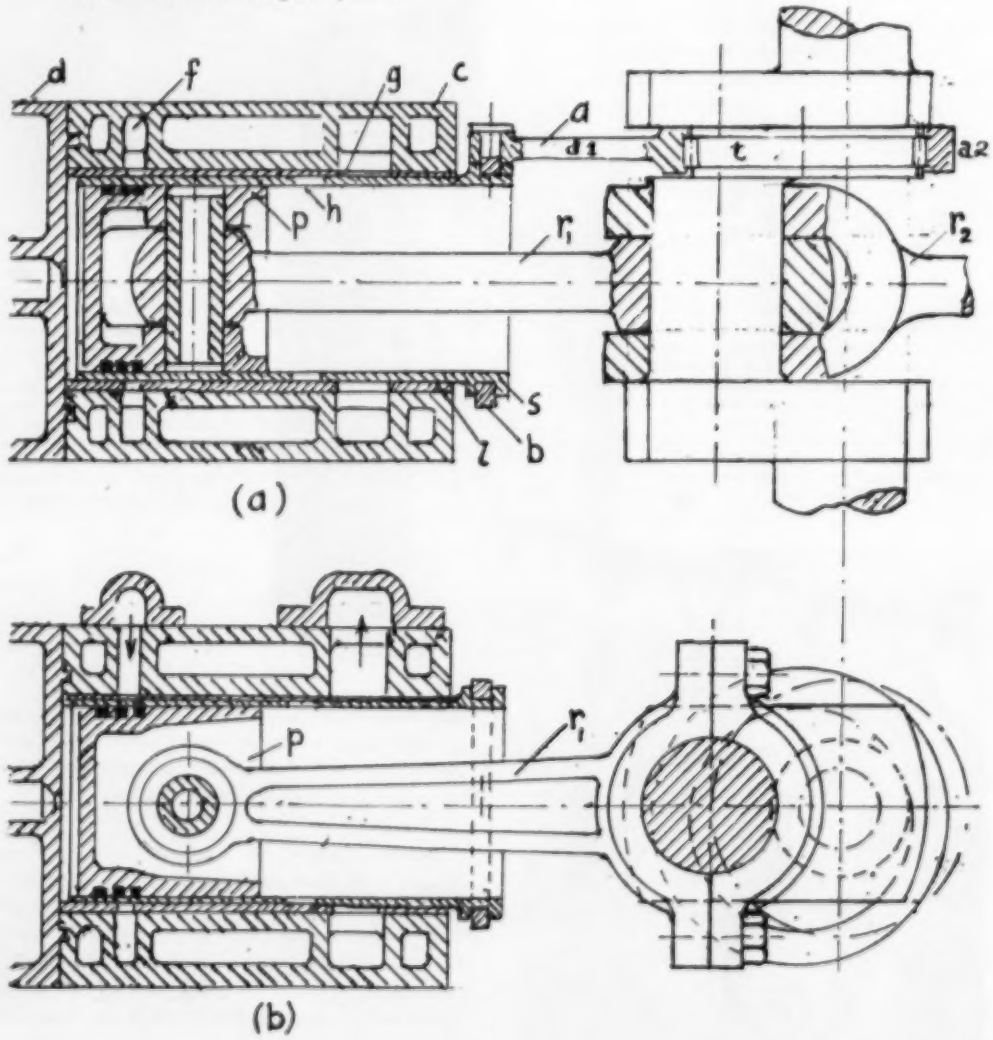
Fig. 1a shows a longitudinal section of a cylinder by a horizontal plane, and Fig. 1b shows a section by a vertical plane. The cylinder liner (l) is inserted into a water-cooled cylinder (c). Inside the liner, the sleeve valve (s) moves in a fixed relation to the main piston. The sleeve valve has exhaust ports (h) and receives its motion from an eccentric rod (a), one end of which is connected to a shifting collar (b) located in a groove in the end of the sleeve valve. The other end of the eccentric rod is connected to the eccentric strap (t). In order to reduce friction, the eccentric strap is supported on the eccentric (e) by means of rollers; the eccentric (e) being part of the crankshaft.

The eccentric rods (a1) and (a2) are connected to the eccentric strap, one (a1) rigidly, the other (a2) hinged. They are similar to the main and auxiliary connecting rods in a radial engine. The liner has two rows of circular ports; ports (f) at the outer end serve for admission of scavenge air; the oblong ports (g) are for exhaust. The cylinder head (d) is watercooled, the piston (p) can be of conventional design. However, in view of the high mean effective pressure which this engine is capable of developing and a resulting large amount of heat developed, it will be desirable to have the piston effectively cooled either by an oil jet against the piston head or by metallic sodium filling as used in heavy-duty exhaust valves. The two connecting rods (r1) and (r2) of the two opposite cylinders have a common center line and one must be a forked design in order to be attached to the same crank.

**Editor's Note: The author of this article is an associate of the inventor of a diesel engine of radical design. We present this article in the belief and hope that some manufacturers may be interested in working with Mr. Shuck in developing his ideas.**

The object of the design is to produce more power with less weight. The design also eliminates valves, valve springs, valve guides, valve (hard) seats, valve spring seats, valve spring-seat locks, rocker arms, rocker arm shafts, bushings and rollers, tappet adjustments, push rods, cam shafts and bearings, timing gears or chains.

**Fig. 1 Horizontal (a) and vertical (b) sections of a Shuck-designed cylinder.**




At the end of the compression stroke, when the piston has reached top dead center, finely atomized fuel oil is injected and the power stroke begins. During the beginning of the power stroke, the sleeve valve, whose motion lags by about 17° behind the piston motion, reaches the top dead center and begins to move in the same direction as the main piston. At the position of the piston when the crank is 110° from the top dead center the ports (h) in the sleeve valve (s) have partially uncovered the oblong ports (g) in the liner and corresponding ports in the cylinders. This position is shown in Fig. 3a, on the opposite page.

When the piston moves with the crank going through another 25°, the sleeve valve begins to uncover the air admission ports (f) while the exhaust ports remain open, Fig. 3b. When the sleeve valve is at bottom of dead center and the piston is about 17° past dead center, the air admission

ports (f) are fully open, and so are the exhaust ports, Fig. 3c. At this moment the piston already moves rather fast and the sleeve valve very slowly. As a result, when the piston covers the exhaust ports, with the crank at about 55°, the sleeve valve begins to cover the air-admission ports as shown in Fig. 3d. At this moment compression begins as the scavenge air has a pressure higher than atmospheric and the pressure first goes up very slowly. By the time the sleeve valve covers the air-admission ports (f) the crank is at about 100° from the top dead center and the pressure begins to go up at an accelerated rate following the law of an equilateral hyperbola.

Summing up the events, it may be stated that the power stroke lasts about 110° of crank travel, the exhaust about 125°, scavenging and air admission about 115° with a nominal overlap, or simultaneous staying open of exhaust and air admission, during about 100°. Actually, because of the throttling of the gases when the ports are only slightly open, the overlap is about 10-20° smaller. In all conventional, high-speed, compression-ignition oil engines, the injection usually begins 10 to 20° before dead center. But in the Shuck engine, injection takes places at top dead center, or very slightly thereafter. A timing diagram of the engine is shown in Fig. 4.

With the piston and sleeve valve moving from the dead center practically in the same direction—moved by the same pressure—the power developed by each of them will be proportional to their respective areas and strokes. The relative values can best be evaluated by this example: Assume the bore of the sleeves and diameter of the piston as five inches, the bore of the cylinder liner and outside diameter of the sleeve as 5¾ inches; the piston stroke may be taken as six inches and the sleeve motion as 1¾ inches. This piston stroke is considerably longer than the present practice in automobile engines. Based on the desirability of decreasing the piston speed and the friction losses connected with it, a modern high-speed engine of conventional design would have a stroke of about 4½ or 4¾ inches. However, one of the advantages of the Shuck design is that the sleeve-valve, moving most of the time in the same direction as the engine piston, reduces the relative rubbing velocity between the piston and sleeve-valve approximately to the rubbing velocity of an engine whose stroke is equal to the difference between these motions—in the present example to six minus 1.25 equals 4.25 inches or even shorter than the present conventional engine would use.

If we assume an engine speed of 2000 rpm and a mean effective pressure of 65 psi, then the power delivered by the main piston may be computed as: $N_1 = 0.7854 \times 5^2 \times 65 \times 6 \times 2000/ (12 \times 33{,}000) = 38.6$ hp. The additional power delivered by the sleeve valve is: $N_2 = 0.7854 \times (5.75^2 - 5^2) \times 65 \times 1.75 \times 2000/ (12 \times 33{,}000) = 3.64$ hp. Thus the total power of such an engine will be: $N = (38.6 = 3.64) \times 8 = 338$ bhp of which the main pistons deliver $38.6 \times 100/ (38.6 = 3.64 = 91.3\%$, and the balance, or 8.7% comes from the sleeve valves.

Another desirable feature is that the exhaust ports begin to be opened when the piston speed is very high, only slightly lower than its maximum value. This insures a very rapid opening of the ports and facilitates the exit of the exhaust gases. Thus when the scavenge-air ports begin to open, the pressure in the cylinder is near atmospheric. In fact, due to the high velocity of the exhaust gases rushing through the wide-open ports, their inertia will even produce some vacuum in the cylinder and thus assist the scavenging of the cylinder. The large overlap—the intake and exhaust ports held open simultaneously for a duration of approximate 100°—gives this engine a new method of cooling the piston and sleeve valve by using the natural advantage of the slowest speed of the piston and sleeve while they are at or near the bottom of their strokes. The large overlap also insures a thorough scavenging,—important for a high mean effective pressure.

When the piston starts on the return stroke, it closes the exhaust ports in the sleeve swiftly. There is a time lag between the closing of the exhaust and closing of the scavenge ports. During this lag, the air pressure in the cylinder goes up near the pressure produced by the scavenge blower. Therefore, the necessary compression pressure is easily obtained without any dangerously small mechanical clearance between the piston and the cylinder head at the top dead center.

During the power stroke, the expanding gases push both the main piston and the sleeve valve. The part of the total downward force which is acting on each is proportional to the area of each part. This gives a compound arrangement that is desirable in diesel engines because the peak of compression is delayed by the fact that the sleeve-valve is lagging behind the piston motion by some 15 to 20 degrees. The fact that the areas are in the ratio of about 3.1-to-1 permits the fuel to be injected after the piston has started down on the power stroke, and this eliminates the sudden impact and shock loading produced in a conventional diesel.

The exit for the exhaust gases is formed by two rows of ports—one row of circular ports in the sleeve valve and oblong slots in the cylinder. This gives the advantage of using the same sleeve stroke for different engine sizes as the stroke length does not affect the port opening to a great extent. A very important feature of the porting scheme of this engine is that the ports are opened and closed near the highest piston speed, thus eliminating choking. The sleeve valve functions as both an intake and exhaust valve, thus eliminating many moving parts by working in connection with the main piston. The sleeve valve is in reality a hollow piston enclosing the engine piston and functions both as a piston and as a valve. Air from the scavenge blower flowing through the cylinder from one end to the other not only scavenges the cylinder, but also cools it and the piston. By a special design making the sleeves hollow or with grooved slots, scavenge air can be used to cool the metal surfaces between the cylinder walls and the sleeve.

**Fig. 2. Below—General arrangement of cylinders. Firing order: 1 and 7 simultaneously; 2 and 8 simultaneous, 90° after; then 4 and 6 and 3 and 5 at 90° intervals. Fig. 4 Right—Timing diagram.**

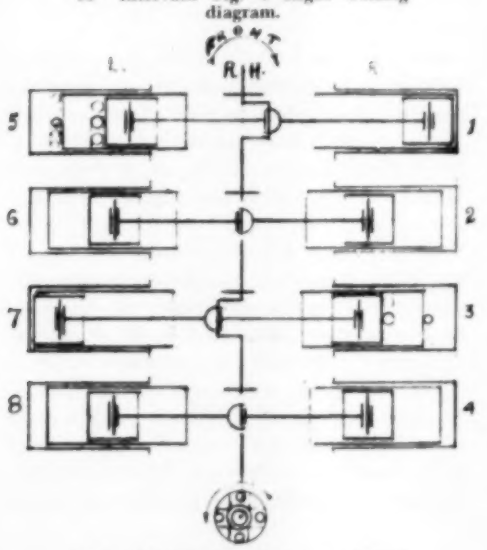
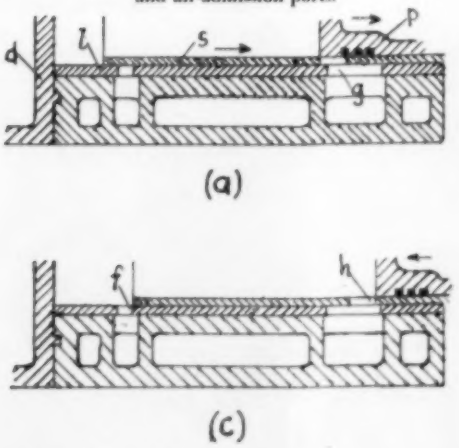
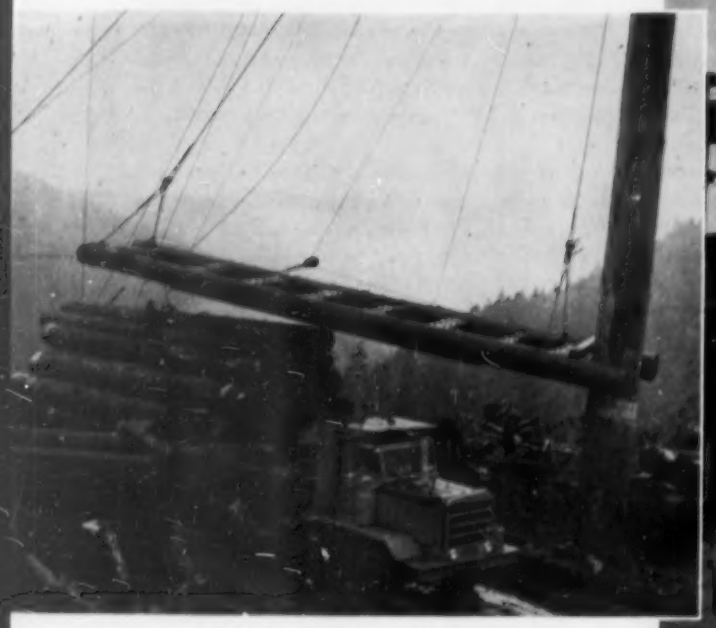



**Fig. 3 Below—Operation of exhaust and air-admission ports.**





Owned by B. C. Forest Products, Ltd., Vancouver, B.C., Canada, this Hayes logging truck is powered by a Model NHRBS Cummins diesel, working through a Twin Disc Model DF truck-type torque converter. Fuller manufactured the transmission; Timken built the rear axle.

A load of logs is being scaled before unloa
Bragg, Calif. The Peterbilt truck is one of
powered by a 300-hp Cummins diesel, driv

# TORQUE C
# IN LOG

THE first significant power conversion in the logging industry was during the Gay Nineties, when the big move began from oxen to horses. A few tears of sentiment may have been shed, but the horse was conclusively faster and more maneuverable – and he didn't have horns. The main point was that he made the logging operator more money. The next power conversion – and a revolutionary one it was – began around the turn of the century; from horses to steam engines. Powering a yarder or loader, the steam donkey could bring more logs slithering through the woods – and stack up more board feet per day – than the loggers dreamed of previously.

But the steam engine had to be stoked . . . and firing took time. You had to wait on steam pressure. If you hurried the "warm-up," you damaged the tubes. And moving one of the squat-built contraptions was like pushing a piano upstairs. The steam engine represented modern power for its time . . . but its days were numbered in logging. Steam was replaced by the flexible, easily operated diesel, working through hydraulic torque converters. With its infinite number of ratios – eliminating engine lugging and maintaining constant line pull – the torque converter gave the diesel engine the same power characteristics of the steam engine it replaced . . . without the trouble.

By the thirties, diesels were powering yarders, loaders, booming tugs and logging trucks. The latter represented a new concept in logging. With the prime timber found farther and farther away, the logging truck soon proved to be the most practical answer. But a severe problem arose in downhill braking . . . a problem that is even more intense today, with GVW's going to 120 tons and over. The problem was to find some means of converting the energy created by a truck rolling downhill into a retarding action . . . yet provide assistance for pulling away under load and climbing steepest grades, without engine lugging. The torque converter that had been so widely adopted on diesel yarders and loaders proved the answer.

Twin Disc torque converters on dieselized equipment proved themselves in logging, beginning in the mid-thirties. Through the broad utility ratio of the three-stage design, hundreds of logging operators have profited substantially from putting more of their available diesel horsepower to work.

In short, loggers found they can make more money with torque converters on their powered equipment. Today, they are profiting even more by capitalizing on built-in hydrodynamic braking in dieselized logging trucks. By doing so, they are slashing maintenance costs on engines, transmissions, clutches, drive lines, brakes and tires. And by providing required ratios through *fluid* – smoothly and automatically – they are pulling away from the loader and climbing steep grades with little or no difficulty.

British Columbia Forest Products Ltd.–one of the leading timber producers in Canada – is a typical example. Here is a company with a reputation for efficient operation . . . and for continually adopting new ways to improve equipment performance. At present, B. C. Forest Products is operating a total of seven camps. To supply four sawmills, a plywood and veneer plant, and a shingle mill, the monthly schedule is 25 million board feet. Dieselized trucks have long played a big role in the picture. The Harris Creek Camp was completed as a full truck operation in November, 1954. Four out of eight new Model HDX-30-80 Hayes logging trucks owned by the company are working here, in addition to three Model CD-849 Kenworth logging trucks. The Hayes trucks are powered by Model NHRBS Cummins diesels, with Fuller 4-speed Model 4-FS-1400 transmissions. The Kenworths are powered by the same model Cummins. All Kenworths have Fuller 5-speed Model 5-FS-1220 transmissions. Thirty-five-ton Columbia trailers are used. Bunks are 12 ft. Stakes are 30 in. And on every truck there is a Twin Disc 3-stage truck-type torque converter – Model DF, with built-in hydrodynamic braking.

Footing varies continually at Harris Creek, due to ever-changing weather. And grades are up to 20%. From the reload to the dump, the distance is approximately 23 miles one way. On the average, loads are 12,000 board feet – although 16,000 feet is not uncommon, and some loads go to 20,000. Each truck is scheduled for three round trips per day. The total average expected per day – hauled to the dump – is 200,000 board feet. Consequently, they have to top 300,000 on good days just to hold

Here is another Cummins-Twin Disc combi
B. C. Forest Products. Transmission is a
Timken Model SFD-4600-T with

ding at the Union Lumber Co. mill in Fort
a fleet belonging to Roy A. Stoddard. It is
ing through a Twin Disc torque converter.

Logs for the Long Bell Lumber Co., are being scaled here near Eugene, Ore. The Mack truck is powered by a Model NHBS-600 Cummins engine with a Twin Disc torque converter. Rear axle ratio is 10.57:1.

# ONVERTERS GGING

the average. Maximum downhill retarding is provided by the torque converters' hydrodynamic braking feature. Converter drive, direct drive, neutral, and the hydrodynamic braking are all fingertip controlled from a valve lever by the operator. The control valve – when switched to the braking position—causes inner and outer oil-actuated clutches to engage within the torque converter. This forces the truck's driving wheels to turn the converter drive shaft, and engine. The result is a powerful braking effect – approximately two-thirds the maximum horsepower rating of the engine – provided by combining the engine compression and friction with the energy absorption of the converter impeller. The final effect is maximum torque converter braking efficiency, with no need of exterior piping or added accessories.

ation in a Kenworth logging truck owned by
eed Fuller Model 5-FS-1220. Rear axle is a
10.16:1 ratio. Tires are 1200x14.

The drivers bring the trucks at Harris Creek Camp down under full load, in second gear, with little or no truck pedal-braking. According to Master Mechanic Larry Crowcroft, only one adjustment in four months was required on the truck brakes.

The trailer brakes are adjusted on an average of once every two weeks. During climbs on adverse grades – or when pulling away from the loader – the high torque utility ratio of the 3-stage design converter lets the diesels wind up to governed rpm quickly, without lugging. Actually, the drivers are pulling away easier at 2000-2100 rpm than they did formerly, with a mechanical drive operating at 1100-1200 rpm.

Important savings are being made at Harris Creek, through longer wear-life on tires, brakes, final drives, and engines. Les Way, Camp Superintendent, believes there may be additional savings through reduced road maintenance. He believes that the smoother application of power through the torque converters prevents wheel-bouncing, which is commonly experienced with mechanical drive and develops a "wash-board" condition on the logging roads.

In the California coastal range, Hammond Lumber Co., Eureka – one of the pioneer users of the torque converter in trucks – reports an interesting analysis of a unit in a converted Mack logging truck. The truck is powered by a Model NHRBS-600 Cummins diesel, working through the torque converter in conjunction with a Twin Disc reverse gear and a 3-speed Brown-Lipe auxiliary transmission. At Hammond's Big Lagoon operation, GVW's go up to 110 tons, and round trips between loader and reload average 42 miles. To determine how much protection the torque converter was providing, Shop Superintendent Lawrence Mosier had the engine of truck No. 119 dismantled after it had burned 20,000 gallons of fuel (comparable to 100,000 miles on a highway truck). New rings were installed, but all liners, pistons and bearings were re-used. In contrast, engines on the trucks without torque converters required both rings and bearings, and one engine required an overhaul.

Also, it was reported that on the torque converter-equipped trucks, the braking feature had provided exceptional brake life. Not one drum had cracked on any of the trucks, and only two brake shoes had been replaced. Final drive life is practically double that of mechanical drive trucks working through transmissions. "The torque converter," Superintendent Mosier adds, "increases both driver competence and production, by minimizing hand-shifting."

At the Vaughn Division of Long Bell Lumber Co., Eugene, Ore., another torque converter installation is providing faster, cheaper hauling – with maximum protection and easier handling – on two Mack Model LMSW-L logging trucks powered by Model NHBS-600 Cummins diesels. Another performance story comes from Roy A. Stoddard, well-known contract log hauler of Fort Bragg, Calif. On two of his Peterbilt logging trucks, Stoddard has a torque converter behind Cummins 300-hp diesels. Through the tremendous boost in pulling power provided by the 3-stage torque converter, the Peterbilts are hauling up to 16,000 board feet . . . and on one occasion hauled a record load of 36,849 feet.

From these reports and many others, it is apparent that the torque converter drive is another substantial contribution to the diesel engine's ability to produce cheaper logs. Through the two important features of built-in braking and lock-out drive, the Twin Disc Model DF converter gives the operator complete control of all grade and load requirements by transmitting horsepower and torque completely through the fluids.

# ELECTRO-MOTIVE'S AEROTRAIN

*By* **BRUCE WADMAN**

A few weeks ago, the Electro-Motive Division of General Motors unveiled its ultra-modern, streamlined Aerotrain, thus making its contribution to the effort to help America's railroads provide better and cheaper passenger service at lower operating costs.

The concept of the new EMD train grew out of conferences last year between a number of railroad presidents and N. C. Dezendorf, vice president of General Motors and general manager of Electro-Motive Division. The main concern revolved around the annual passenger service loss of $700 million. The need, as the railroad presidents voiced it, was for new hauling equipment with a minimum investment, reduced operating and maintenance costs, lowered center of gravity, increased average speed and improved riding comfort. These improvements would make lower fares possible and would lure passengers away from private cars, buses and airlines. With these factors in mind, Mr. Dezendorf put EMD designers and engineers to work.

The key to profitable railroad passenger trains lies in lowered costs and speed of turn-around. Critical passengers, who demand and expect more from railroad service than they do from motor coach and private auto travel, dictated the need to build luxury into railroad passenger cars. Railroad management, therefore, asked for such cars, – and manufacturers are beginning to deliver them. GM's effort is worthy of special mention largely because standard, or very slightly modified, components from its various divisions' production lines are used in building its train.

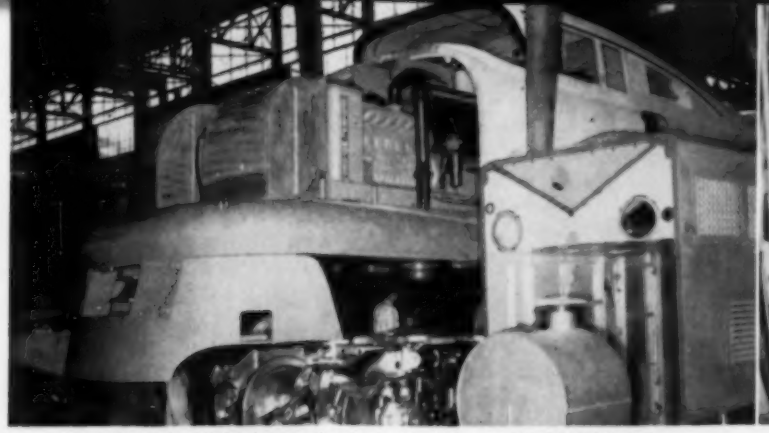
Although, in outward appearance, the Aerotrain appears to be radically different, its major parts are familiar. (See "The New Lightweight Diesel Passenger Trains", September, 1955 DIESEL PROGRESS). General Motors has proved that there is no need to retool completely and to test untried units in order to construct the train of the future. This not only saves time in designing and building the train, it also lowers the cost to the purchaser.

One of the Aerotrains goes to the Pennsylvania RR and the other to the New York Central. Thereafter, one train will be made available to the New York, New Haven and Hartford and another will try out on the western railroads, beginning with the Santa Fe.

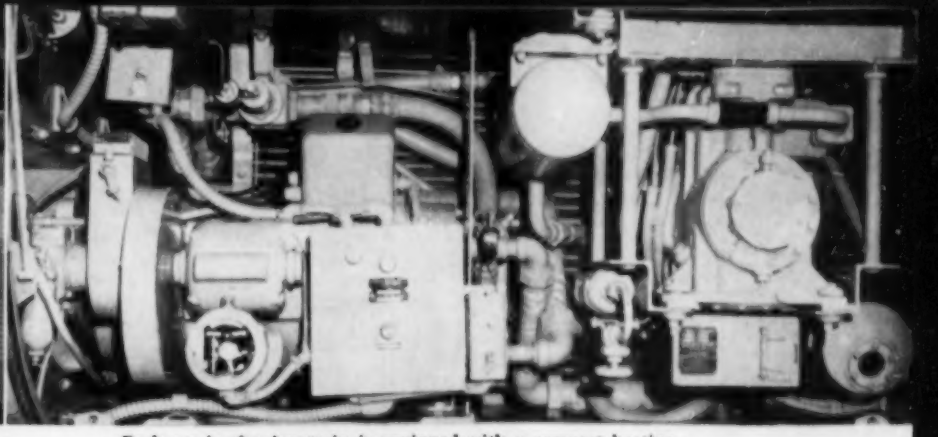
The main propulsion engine is a GM Model 567-C

***Left, above*—The new Aerotrain is shown on a trial run, and, in the middle photo, the locomotive is shown before being "trucked" in the La-Grange, Ill., plant of General Motor's Electro-Motive Division.**

**A new automatic coupling device is used on the train. It couples air, power and control lines in one operation and there is no need for a brakeman to crawl between the cars.**



The lightweight locomotive is powered by a GM Model 567-C 12-cylinder diesel engine which develops 1200 hp at 835 rpm with two traction driving motors. The engine and components are low slung to give a low center of gravity.



Each car in the Aerotrain is equipped with a compact heating and air conditioning unit. This machinery compartment, as is the luggage compartment, is placed below seat level, giving passengers a "high level" ride.

12-cylinder diesel developing 1200 hp at 835 rpm with two traction driving motors. The total tractive effort is through the front truck which is a standard F9 type with four wheels. One traction motor is on each side of the truck. The back truck is a 2-wheel, single-axle idler without motors but with brakes. It is a non-swivel-rigid type idler truck. The 4-wheel truck is reversible. The generators and accessories are standard.

The engine and drive components are low slung in the locomotive to give the entire unit a center of gravity only 57½ in. above the rails as compared to standard EMD locomotives whose center of gravity is 65 in. above the rails. The entire motive unit has been designed to present a low, sleek appearance and to fit well with the 10 passenger cars it pulls. The entire train of locomotive and 10 cars weighs approximately 450 lbs. per hp. The Aerotrain's cooling system is identical with those found on the export models of EMD locomotives. A centrifugal water pump is mounted on the accessory drive gear, circulating the water. The radiator cooling fan is driven by the engine off a front-end drive through an angle drive unit controlled by an air clutch. The radiators are located in the roof at the rear of the locomotive. The engine faces backward.

Two GM 6-71 diesel generator sets in the nose, turning at 1200 rpm, drive 60-kw ac Delco generators directly. These sets provide current for complete circuit control, lighting, battery charging and to maintain the Frigidaire air conditioning of the coaches in addition to providing separate excitation of the main generator. Dynamic braking will give the economy of electric braking and control speed on long grades.

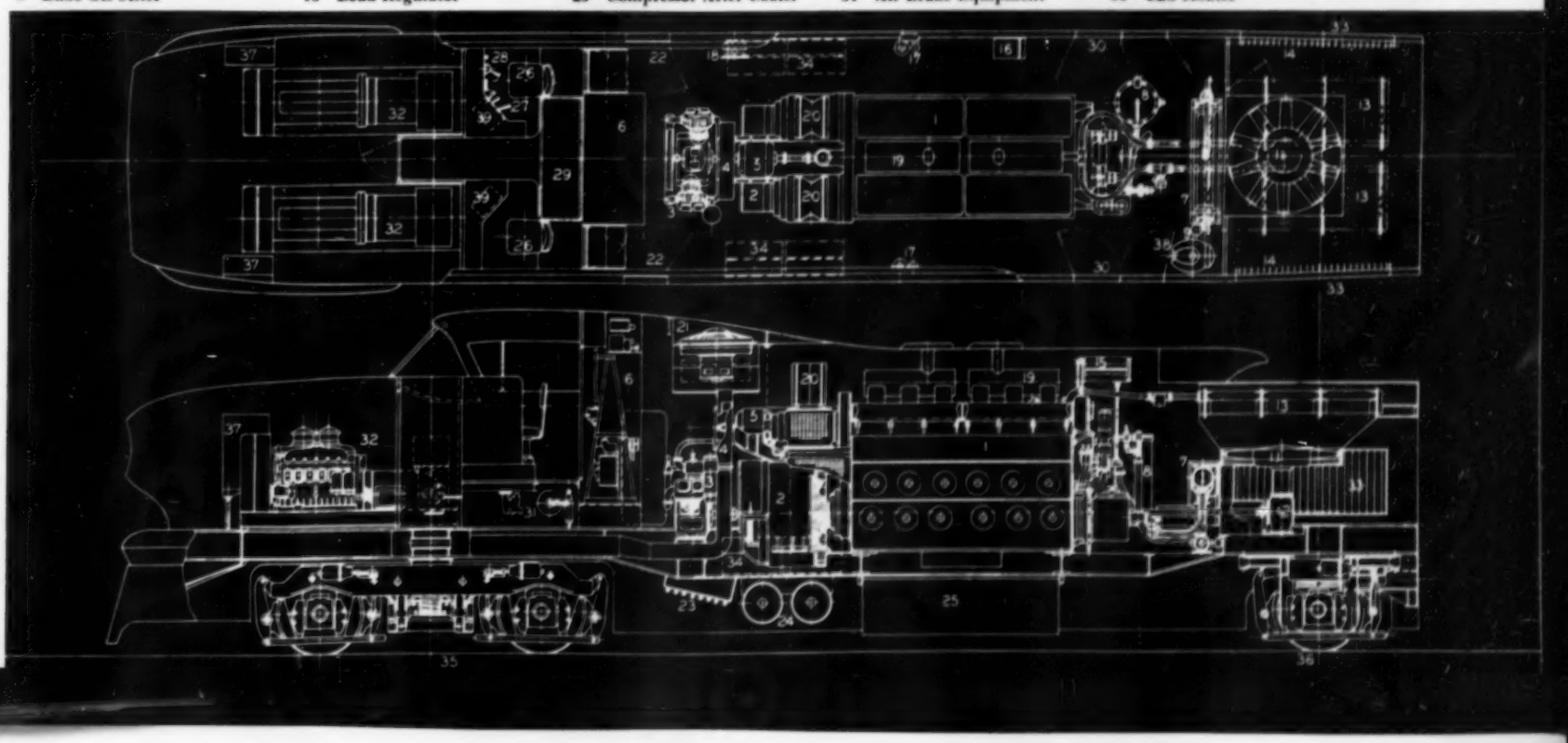
The passenger cars warrant a few words inasmuch as a number of innovations in rail travel have been introduced by them. Basically, the upper part of the cars are 40-passenger GMC coach bodies widened by 18 in. for greater room. The space given over to driver and engine in a bus becomes a vestibule on the train. The doors and steps have been arranged to serve both high and low station platforms. The body of each car is mounted on a 4-wheel underframe. The car body is so low in first cost in comparison with present cars that it can be regarded as expendable. The under-carriage, however, is entirely new and has been made with unusual stamina to last many years. It is believed this combination will appeal to rail executives who have shuddered in the past at the high cost of periodically rehabilitating passenger cars. A large margin of safety has been built into the cars. For example, they will withstand 800,000 pounds buff although regulations require only 400,000 pounds for a train of this weight. The suspension is completely air-ride with many of the members interchangeable with those of the ordinary standard GMC bus construction.

Another time-saving and labor-saving feature of the cars which adds to personnel safety is the automatic coupling device, which, in one operation as it couples, does what previously required several operations. It is not necessary for trainmen to crawl between cars to make the several couplings. As the "knuckles" join, contact is made automatically for air lines, power lines and control lines.

Two of these 40-passenger cars are equivalent in capacity to one conventional 80-passenger car. However, those two GM cars weigh about 30 tons as compared to the 65 tons for the conventional car. When tooled for volume production, it is anticipated that the new cars will cost $900-$1000 per seat compared to the $2250 per seat of the newest present coaches.

The prime mover will consume approximately 1.3 gallons of fuel oil per mile with full load on level country, EMD officials say. Using the current price of fuel in Chicago, this means that the train could move its 400 passengers at 100 mph from Chicago to New York for about $125 worth of fuel or 32c per passenger. To duplicate this performance with present coaches would require two of the same GM diesels in the standard EMD E9 high-speed passenger locomotive at about 80 cents per passenger for fuel.

1 Engine—EMD Model 12-567C
2 Generator—EMD Model D15E
3 Air Compressor
4 Traction Motor Blower
5 Aux Generator
6 Electrical Control Cabinet
7 Lube Oil Cooler
8 Lube Oil Filter
9 Fuel Filter
10 Fuel Pump
11 Cooling Fan
12 Fan Drive Gear Box
13 Radiators
14 Shutters
15 Water Tank
16 Load Regulator
17 Fuel Tank Vent & Flame Arrestor
18 Hand Brake
19 Exhaust Manifold
20 Air Filter
21 Dynamic Brake
22 Body Side Door
23 Compressor After Cooler
24 Main Air Reservoir
25 Fuel Tank
26 Cab Seat
27 Controller
28 Brake Valve
29 Trap Door
30 Maintenance Doors
31 Air Brake Equipment
32 Generating Set—Model 6-71
33 Engine Cooling Air Intake
34 Batteries
35 Power Truck
36 Idler Truck
37 Sand Boxes
38 Hopper
39 Cab Heater



# FLORIDA'S

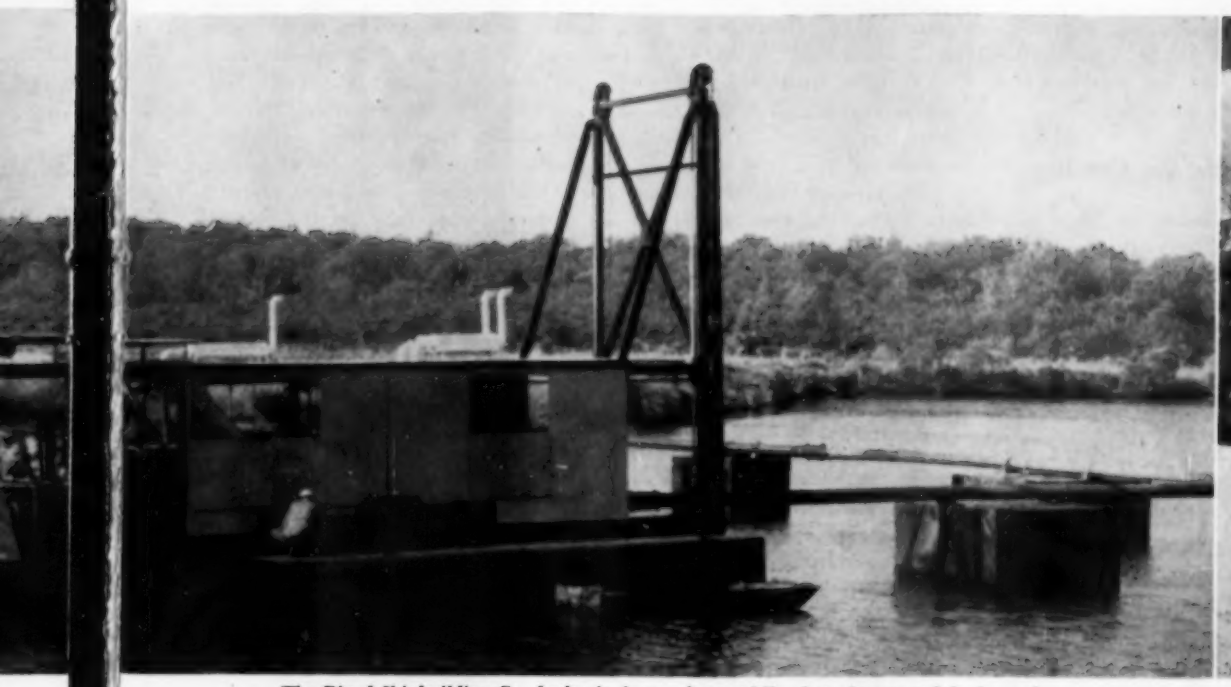
FLORIDA'S rapidly-growing population has a seemingly insatiable appetite for water-front footage. Land near the water is desirable because the climate is warm throughout the year and the magnet that draws many persons to Florida is the opportunity for sports and outdoor living made possible by an abundance of warm water and sunshine. Florida's water includes 1500 miles of sea coast and about 30,000 inland lakes.

But Florida is a low-lying peninsula much of which is swampland and none of which is more than 20 feet above sea level. Therefore, there is a heavy demand for dredges, especially small dieselized dredges that can quickly convert small patches of spongey waterfront into solid ground on which homes, hotels, motels and factories for light industries can be erected.

Government lending agencies that are helping thousands of families build homes in Florida require property on which loans are granted to be seven or eight feet above sea level. This is not difficult – with proper dredging equipment and know-how – even at the edge of the Everglades where much of the expansion is now in progress.

To meet the demand for this type of dredging, Diesel Shipbuilding, Atlantic Beach, Fla., designed and built a new portable suction dredge. Considerable research was done before actual construction started. The result was a most unusual feature – portability over land and water. Designed for quick knock-down and assembly, ashore or afloat,

**Front view of the Diesel Shipbuilding dredge, working on the Inter-Coastal Waterway. The cutter shaft is shown, entering water at left of the 10-in. suction line.**



The Diesel Shipbuilding Co. dredge is shown above, while photo in upper left shows the GM 2-71 diesel, rated 45 hp, which drives the hauling and hoisting gear. Primary power is provided by twin GM 6-71 engines which drive the suction pump through a Falk coupling.

The discharge from this 10-in. pipe indicates how rapidly swamps can be converted into building sites by diesel-driven dredges.

# 'S OVERLAND DREDGE

*By* ED DENNIS

the weight and dimensions of all sections fall within the limitations set for overland transportation by trailers. Thus, the dredge can be used either along the sea coast or on inland lakes.

The hull consists of two steel pontoons, raked on the ladder end and fitted together as each end by an H beam. Each section is 10x40x4 ft., making a single flotation unit 40 ft. long, 10 ft. wide, and 4 ft. deep. All machinery, spud, and ladder framework are mounted on heavy H-beam skid frames. The spud end of each pontoon contains fuel oil compartments of 2500 gallons each.

Twin General Motors 6-71 diesels provide continuous horsepower of 290 at 1800 rpm. This power unit is coupled to the shaft by a Falk flexible coupling and is used solely to drive the Georgia Iron Works 10x8 suction pump.

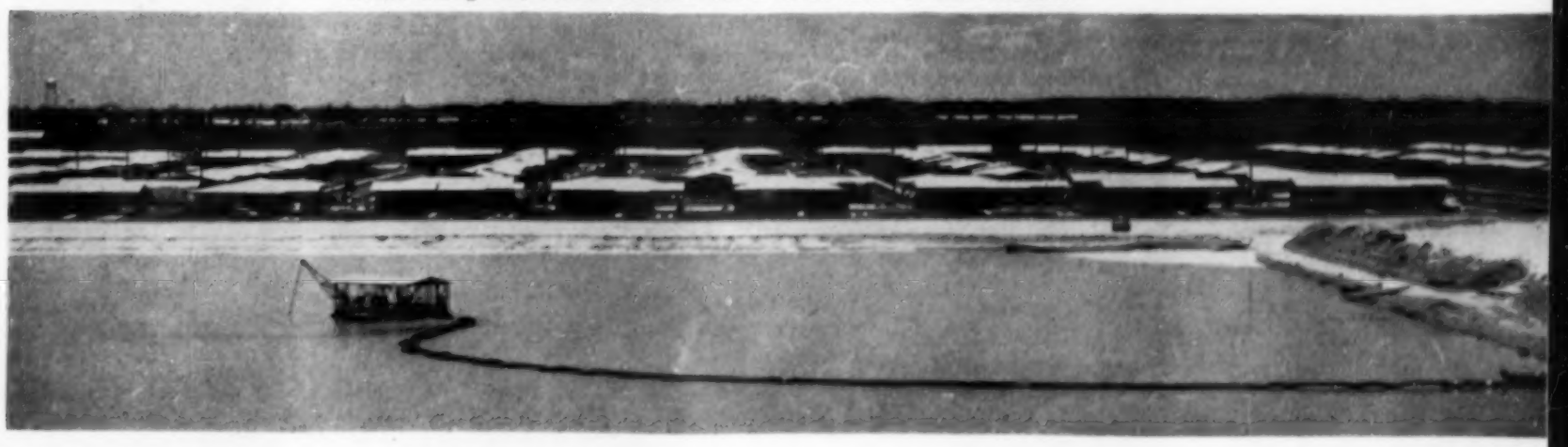
A 45-hp General Motors 2-71 diesel is on the dredge for auxiliary purposes. It drives the Peacock cutter through a Falk reduction gear. Through a front power take-off it also drives the hauling and hoisting gear and a 2-in. Fairbanks-Morse service pump.

Two 8-in., 26-ft.-long steel pipe spuds are fitted to the skid frame and spud wells on the after end of the dredge. The wells are 10 ft. apart to permit walking the dredge ahead. The spuds are raised and lowered by 5/8-in. wire rope, pulling over 12-in. sheaves. The dredge has a designed maximum cutting depth of 20 ft. with the ladder 45° below the horizontal.

While the Diesel Shipbuilding dredge is one of the newest and most interesting of those working in Florida, is only one of many. (See page 41 of July, 1955 DIESEL PROGRESS for a report on "Turner Dredge No. 1"). Another example is a dredge owned by Alonzo Cothron, now working on the Florida Keys. Powered by Caterpillar diesels, it can pump 350 cu. yds. of sand an hour.

Another portable dredge is working on man-made Palm Springs Lake, west of Hialeah. It is owned by Andy's Trucking Service. On it, a GM 6-71 diesel drives an 8-in. Maddox pump, and a 4-cylinder Hercules diesel powers a Gorman-Rupp pump for sand agitation. Andy Capeletti, the owner, says: "For this type of operation, it is cheaper to use a dredge than a dragline. This way I can get a couple of thousand dollars more of fill dirt per acre out of the lake." At the same time he is creating another lake for Florida, Mr. Capeletti is raising the elevation of the surrounding land so that it can be used for homesites.

Here is another portable dredge, owned by Andy Capeletti, shown in service on man-made Palm Springs Lake on the edge of the Everglades near Hialeah. After the dredge has finished making land, thousands of homes will be erected on the reclaimed tidelands.



## Moves West Coast Office

The De Laval Pacific Company announces that it is officially open for business at its new address, 201 East Millbrae Avenue, Millbrae, California. Faced with a growing need for enlarged office space, warehousing, and more area for its machine shop, the De Laval Pacific Company commissioned architects to answer their needs, including the problem of parking space. The De Laval personnel associated with the San Francisco office are now at the new address.

## Reports on Natural Gas Use

Natural gas has become the fastest growing primary fuel in North America, according to a recent report from H. G. Barten, manager, Worthington Corp.'s Gas Transmission Section of Engine Sales Division. Mr. Barten stated that a recent survey conducted for his company showed that consumption of natural gas has increased from 500 billion cu. ft. in 1920, to more than 6000 billion in 1950. Today, well over 20,000,000 people in the United States rely solely upon natural gas for heating and cooking purposes. In addition, upwards of 2,000,000 industrial firms are using gas as a major source of energy in their manufacturing operations.

Not too long ago, gas producing oil wells were considered worthless and the valuable gas was burned off as waste. In North America, the discovery of oil in Pennsylvania played an important role in the development of natural gas. In the oil rush which followed, many wells were drilled only to find that they would eject gas instead of "black gold." These wells were considered dry and drillers often ignited billions of cubic feet of natural gas at the well head, leaving the wells to burn out.

With the development of a high-pressure pipeline, oilmen had a means for removing the gas from oil fields and transporting it over miles of countryside for community and residential use. Of significance to the gas transmission industry was Worthington Corp.'s development in 1903 of a workable gas compressor.

The company has since manufactured equipment for a vast network of natural gas pipelines for the transmission of gas across the North American continent and in Latin America.

According to Mr. Barten, the gas industry has had a phenomenal growth since World War II, with an average of 15,000 miles of gas pipeline laid each year. Today, the industry has become the largest single source of business for the stationary engine manufacturing industry. Commenting on Worthington's part in this expanded industry, Mr. Barten explained that his company furnishes vital equipment including centrifugal compressors, angle type gas engine compressor units for pipeline, gathering and repressuring service, power engines for driving centrifugal and reciprocating compressors, and related accessory equipment.

## Consultant to Westinghouse

Admiral Robert B. Carney, recently retired as Chief of Naval Operations, has become a consultant to the Westinghouse Electric Corp., according to Chairman and President Gwilyn A. Price. Mr. Price said Admiral Carney will, among other civilian duties he plans to undertake, consult with Westinghouse management or the development of equipment for the military services. "Because of Admiral Carney's long and varied background in the Navy, we know that he will be able to give us much practical guidance, particularly from the standpoint of operational requirements for military equipment," Mr. Price said.

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SPECIAL SERVICE TOOLS!

Next time you refer to your GMC Maintenance Manual, notice how often it specifies the use of a "J-number" tool . . . like the J 4863 shown above, for example, which is used in servicing heavy duty axles.

That "J", you know, is the prefix used to designate Kent-Moore "Rate-Maker" Special Service Tools. And there are many good reasons why their use is recommended. For you see, Kent-Moore Tools are developed in cooperation with your vehicle manufacturer to perform many important maintenance operations for which no adequate standard tools exist. They save time, prevent parts damage, improve service efficiency, And, combined, they give you the means of duplicating factory-assembled conditions in the field. So whether you service your own GMC's or have them serviced by others, make sure the job's done right . . . with Kent-Moore Special Service Tools!

**UPON REQUEST**—Complete information on the entire line of Kent-Moore "Rate-Maker" Special Tools for servicing GMC Trucks & Coaches according to factory-recommended procedures. There's no cost, no obligation . . . so send for it today!

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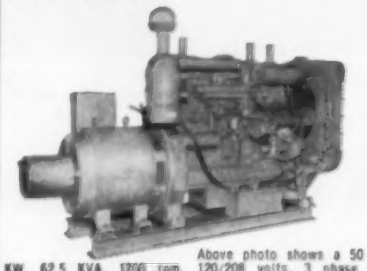
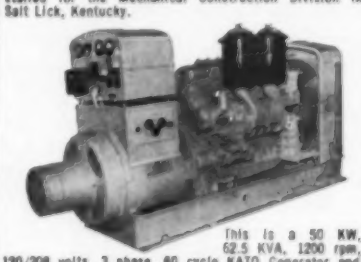
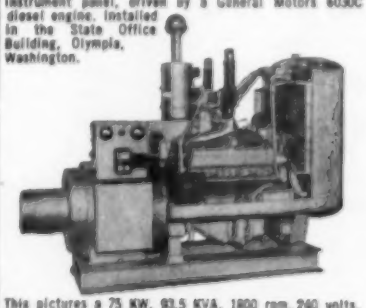
GENERATORS
. . . a size and type to meet your needs to 400 kw



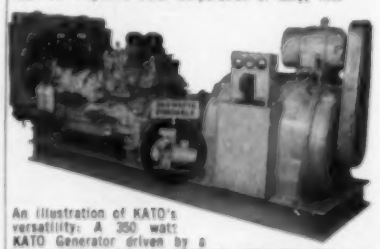
Above photo shows a 50 KW, 62.5 KVA, 1200 rpm, 120/208 volts, 3 phase, 60 cycle KATO Generator and instrument panel, driven by an International Model UD-18A diesel engine. Installed for the Mechanical Construction Division in Salt Lick, Kentucky.



This is a 50 KW, 62.5 KVA, 1200 rpm, 120/208 volts, 3 phase, 60 cycle KATO Generator and instrument panel, driven by a General Motors 6030C diesel engine. Installed in the State Office Building, Olympia, Washington.



This pictures a 75 KW, 93.5 KVA, 1800 rpm, 240 volts, 3 phase, 60 cycle KATO Generator and instrument panel, driven by an H-540 LeRoi engine utilizing natural gas for fuel. For Republic Steel Corporation of Gary, Ind.



An illustration of KATO's versatility: A 350 watt KATO Generator driven by a Lauson LMH engine and a 150 KW, 187.5 KVA, 750 rpm, 120/208 volts, 3 phase, 25 cycle KATO Generator and instrument panel—driven by a General Motors twin 6-71 diesel engine. For Duluth, Mesabi & Iron Range Railway.

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## Nordberg Bulletin

Publication of a new 12-page, three-color bulletin describing Nordberg Supairthermal diesel marine engines is announced by Nordberg Manufacturing Co., Milwaukee 1, Wisc. Bulletin 233 describes available drives, dimensions and weights in the four-cycle, in-line engines. Bulletin 233 is available free upon data. A cutaway view through a power cylinder shows the lubrication and cooling water systems. Photographs show tugs, tow boats, fishing craft, dredges, ferries, cargo ships, tankers and fire boats now powered by Nordberg Diesel engines. Bulletin 233 is available free upon request. (ITS NEW)

## ASME To Discuss Diesel's Future

"The Diesel Engine's Progress and Future" will be the subject of discussion by a panel of experts during the Diamond Jubilee convention of the American Society of Mechanical Engineers to be held in Chicago November 13-18, inclusive. The diesel session will be held the morning of November 15th in the Lincoln Room of the Congress Hotel.

Panel members for the forum on the diesel engine will be: Robert Cramer, Jr., assistant director of engineering, Nordberg Manufacturing Co., Don J. Cummins, vice president-engineering, Cummins Engine Co., Hans Hogeman, chief engineer, Fuel Injection Section, American Bosch; Eugene W. Kettering, director of research, Electro-Motive Division, General Motors Corp., with Rex W. Wadman, publisher, DIESEL PROGRESS, as moderator. Background for the discussion will be laid by the reading of a short paper on "The Diesel Engine's Progress and Future," prepared jointly by Mark Ogden, executive editor, and Bruce Wadman, midwest editor, of DIESEL PROGRESS.

Theme of the ASME's 75th anniversary convention is "The Engineer and the World of Commerce and Industry." According to Harold S. Sizer, ASME machine design division meetings committee chairman, the diesel forum is one of a series of meetings to show the contribution of design engineers to various phases of today's economy. The session was arranged by John Haydock, chairman of the executive committee of the machine design division.

## Two 1400 Kw Units

Two 4500-kw diesel generators, among one of the largest ever built for a diesel plant, will be installed early in 1956 by Lea County Electric Coop, Lovington, New Mexico. The added 9000 kw will raise plant capacity from 12,030 to over 21,000 kw. The engines will be 6296-bhp, 240-rpm, 12-cylinder, 2-cycle units built by Nordberg Mfg. Co., Milwaukee. The generators, being built by Electric Machinery Mfg. Co., Minneapolis, will be rated 5625 kva, 4500 kw, 240 rpm, 2400/4160 volts. Electric Machinery also will supply two 600-hp scavenger compressor motors. Consulting engineers for the installation are the A. C. Kirkwood Co., Kansas City.

## Industrial Rubber Products Described

Specifications and descriptions of 68 different rubber hose for every industrial and agricultural use are presented in the new eight-page catalog digest announced by the Industrial Rubber Division of the Thermoid Company, Trenton, N.J. Several of the hose types described are new additions to the Thermoid line and have only recently been added. In addition, the brochure contains data on nine types of conveyor belts, seven types of flat power transmission belting, multiple and fractional horsepower V-belts, chute lining, rubber sheet packing and industrial friction materials. Twenty-three cutaway photos show hose, coupling and belt construction. (ITS NEW)

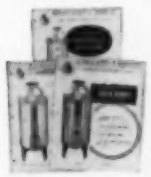

108
Standard Models

Honan-Crane
Multi-Cartridge Filter

Why 108 models of the same basic filter? *Because each oil filter application creates individual problems.* Scores of variable factors are involved: type of oil, additives, oil viscosity and temperature, flow rate, capacity, space available, nature and degree of contamination, type of heating required, and many more. *All* of these factors must be considered in selecting the proper filtration unit.

Honan-Crane Multi-Cartridge Filters are available in 108 models, ten sizes, and with six different types of interchangeable cartridges, each designed to do a special filtering job. Thus, no matter how unusual or difficult the application, you get a filter exactly suited to your requirements . . . and readily adaptable to changing requirements.

The same wide choice of models is also offered in Honan-Crane Bulk Refill and Full Flow type Oil Filters. Custom filtration performance is *standard* with Honan-Crane.



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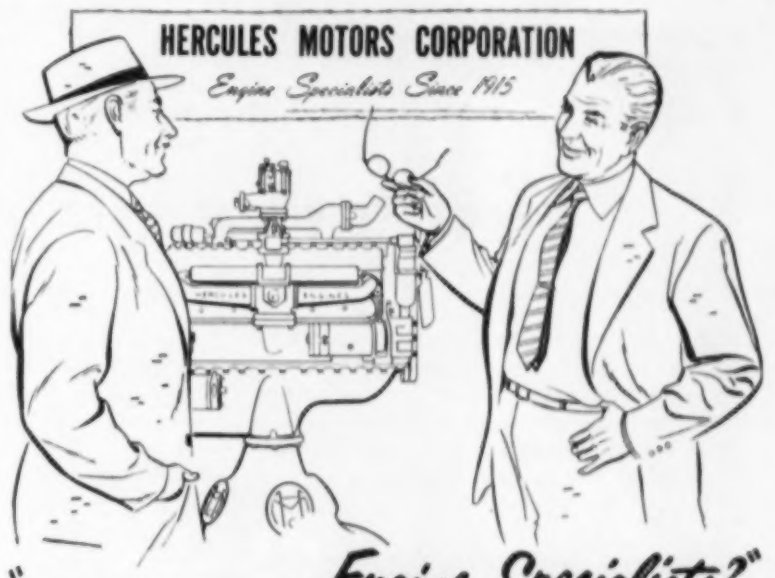

"What do we mean . . . *Engine Specialists?*"

Briefly, it means that Hercules manufactures engines to meet the customer's requirements. These engines are produced by modern methods and each engine is tailored to fit the equipment which it will power.

The wide selection of engine sizes in the Hercules line, plus the flexibility of our production facilities enable us to specialize in building engines to meet the customers needs. We have over 90 different basic engine models, ranging from 3 to 500 H.P., available for operation on gasoline, diesel fuel, L.P.G., natural gas and kerosene.

Further, it is our policy to work with customers and to help them select the type of engine best suited for their equipment. We do more than merely suggest the use of a standard type engine. Hercules engineers work with the product engineers to select an engine with accessories and other engine components modified or positioned to fit the requirements of the end product. After these engineering problems are solved and the test engine has proved itself, our production of these engines is scheduled to meet your delivery requirements.

***Whether your engine requirements are for 1 or 1001, specify Hercules Engines, the product of Engine Specialists Since 1915.***

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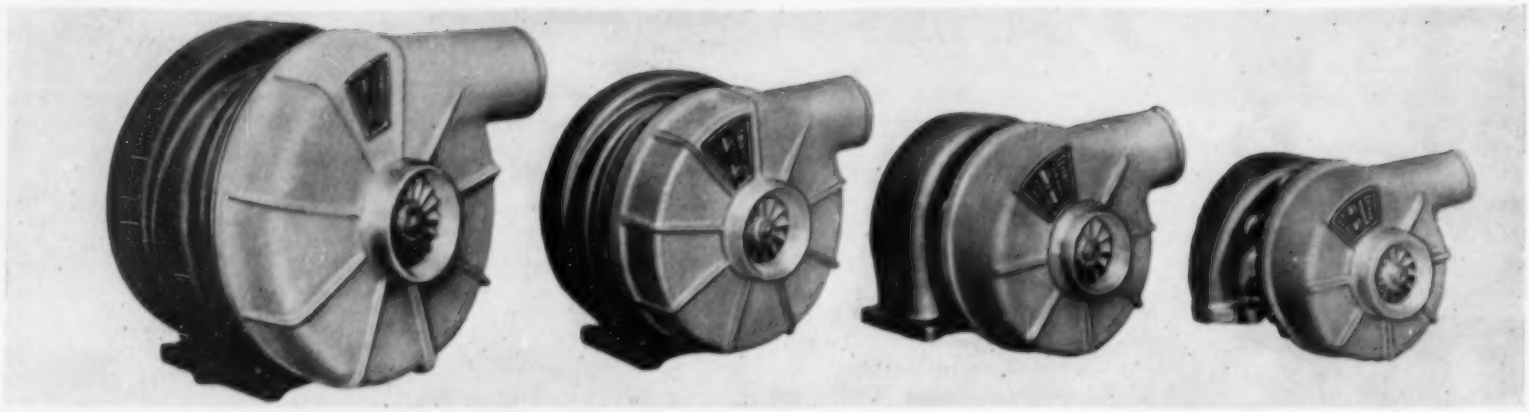
HERCULES MOTORS CORPORATION
*40 Years of Engines for Industry*
127 Eleventh Street, S. E. • Canton, Ohio



**These new Schwitzer turbochargers can be applied, in single or multiple units, to engines ranging from 50 to 1200 bhp.**

# NEW LINE OF TURBOCHARGERS

A complete line of four Schwitzer turbochargers, shown in the accompanying photograph, is the result of over 30 years' engineering and producing superchargers for diesel and gasoline engines. This versatile line is adaptable, in single or multiple units, to a wide range of engines from 50 to 1200 bhp, naturally aspirated.

Many economies are achieved since turbocharged engines will deliver more power per dollar than unsupercharged engines, and the cost per horsepower added by the turbocharger will be one-third to one-fourth the cost per horsepower of the basic engine. The cost of vehicles can be reduced since a lighter chassis can be utilized, with the smaller and lighter turbocharged engine. On trucks and earthmoving equipment, turbocharged engines make possible greater pay loads at higher speeds, not only reducing the initial cost of the vehicle, but also increasing its revenue earning ability.

The light weight of Schwitzer turbochargers and the compact size permits simplified mounting, usually directly on the exhaust manifold, within existing space limitations, according to factory engineers. There is no necessity for special supporting framework or bracing. The weights of the four sizes are as follows:

| *Turbine Wheel Size* | *Weight* |
|---|---|
| 3.5 in. | 20 lbs. |
| 4 in. | 28 lbs. |
| 5 in. | 40 lbs. |
| 6 in. | 55 lbs. |

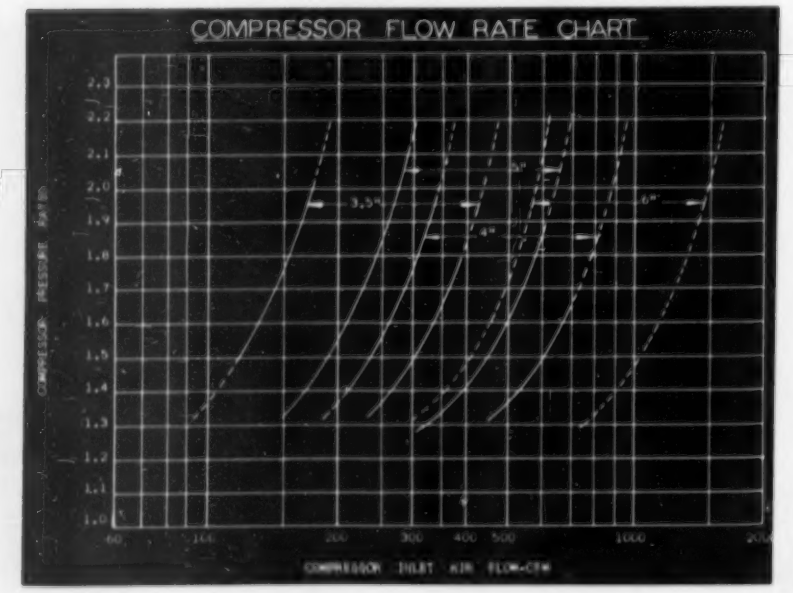
The wide range of compressor air flow at pressure ratios exceeding 2.0 are shown on the flow rate chart for the four sizes of 3.5, 4, 5, and 6 in.

The Schwitzer turbocharger can be adapted to a wide variety of engines without change in basic design, executives state. Interchangeable stainless steel turbine nozzle rings are available to match the operating conditions of each specific engine application. Illustrated on this page is a typical turbocharger installation on one of the newest diesel truck engines. A typical horsepower and torque curve also shows the performance obtained and the fuel consumption representing the fuel rate of the engine at maximum power.

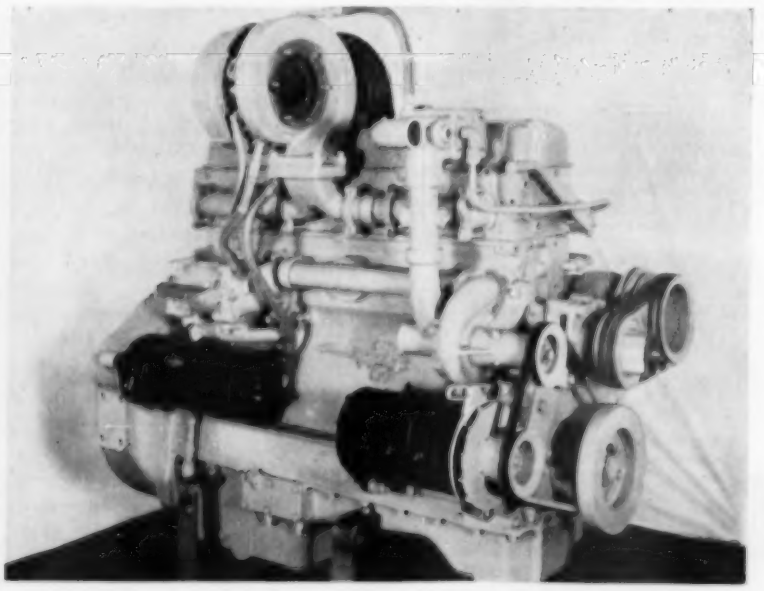
Increased efficiencies are constantly being developed and turbine operating speeds are being increased beyond those believed impractical only a short time ago. Also significant results are being obtained with the use of after coolers which reduce the temperature of air leaving the turbocharger and permit increased performance over a wider range. The use of the after cooler is encouraged wherever possible.

The design configuration of the stellite turbine wheel combined with aluminum compressor wheel, result in extremely low inertia and low stress. Only a fraction of a second is required for the turbo to reach approximate full speed when a load is suddenly applied to the engine. On variable speed engines such as trucks or buses, this is of prime importance to the vehicle operator. Other parts of the turbo are constructed of the finest of materials, to insure a rugged and simple design capable of long, trouble-free service.

**Shown below is a typical horsepower and torque curve, indicating the performance at maximum power.**




**Compact and light in weight, these turbochargers usually can be mounted on the exhaust manifold within existing space.**



## Announces 37th Annual Meeting

The Associated Equipment Distributors will hold their 37th annual meeting January 29 through February 2, 1956 in the Conrad Hilton hotel in Chicago. The convention committee, headed by W. A. Patterson, Richards Equipment Co., Waco, Texas, is planning a program designed to capture the interest of the more than 3000 distributors and manufacturers of construction equipment expected to attend. Others on the committee include S. G. Marks, Marks Tractor & Equipment Co., Cleveland; Don F. Nickel, Don F. Nickel Equipment Co., Grand Rapids; R. F. Newlin, Newlin Machinery Corp., Kansas City; and C. C. Tamborino, The George T. Ryan Co., Minneapolis.

## Saga of Machine Tools

The evolution of machine tools—starting with the cave man's crude implements, continuing through the fabulous machine tools of today, and projecting into the machines of the future—is told in story form in the latest issue of "Production Road," a publication of the Twin Disc Clutch Co., Racine, Wisc. A free copy may be obtained by writing this manufacturer of friction and fluid drives for industrial powered equipment. (ITS NEW)

## Fiber Glass Filter Cartridge

Porous Plastic Filter Co., Inc., one of The Pall Filtration Companies, announces its new "Glas-Kleer" fiber glass filter cartridge to fit standard filter containers. Designed to meet the need for low cost scientifically graded throw-away filter cartridges, "Glas-Kleer" cylinders are being offered in 2, 10, 25 and 50 micron grades. After extensive laboratory and field tests, super fine glass fibers were chosen for their high chemical and temperature resistance, and non-absorbent structure. Each cylinder is lined with fiber glass cloth to insure lint-free filtration and is provided with variable density to insure long life and high holding capacity. (ITS NEW)

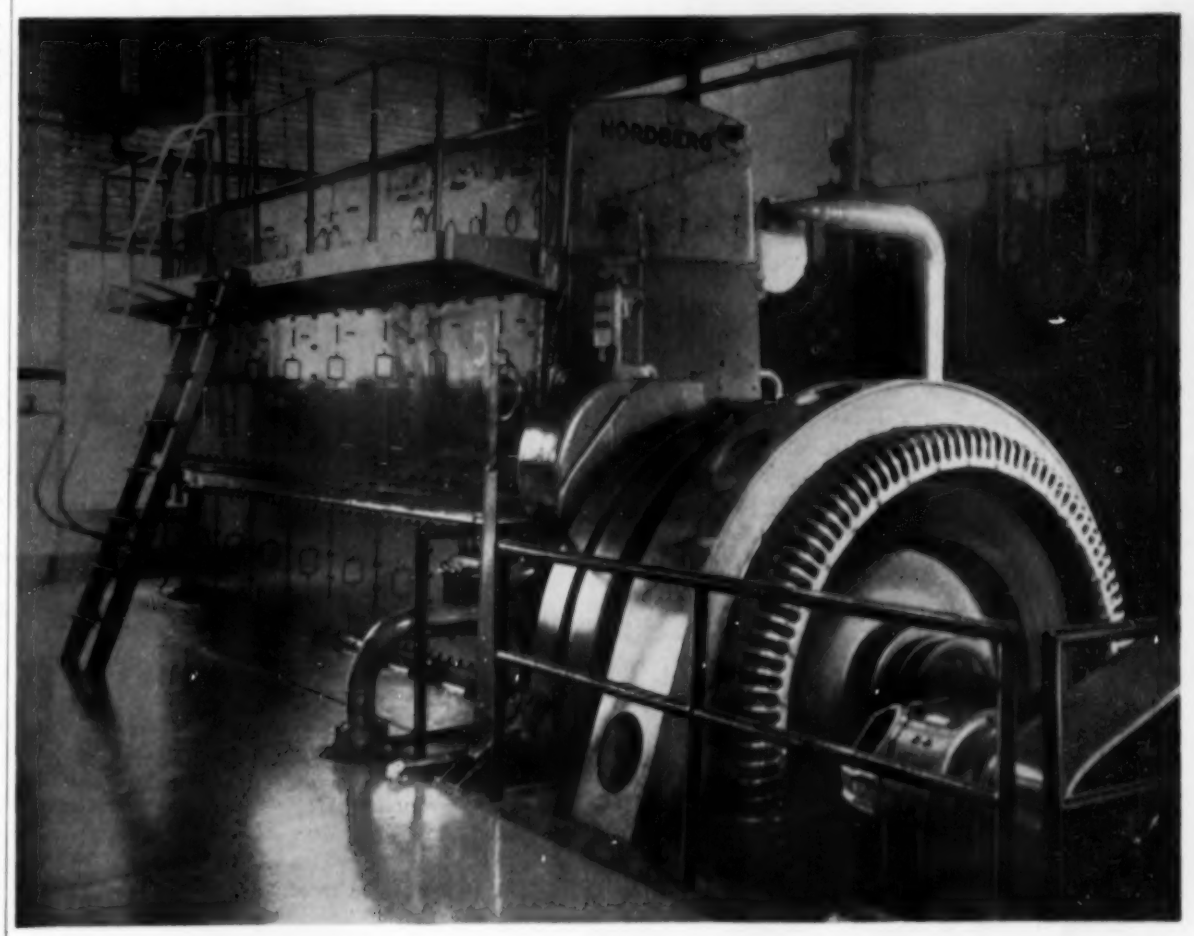
## New Nordberg to Bermuda

The Bermuda Electric Light Co., faced by an increasing demand for current, has purchased in the United States a new diesel-electric generating unit the cost of which, landed on the island, will be about $750,000. The new unit consists of a 10-cylinder 5100-hp Nordberg diesel, driving a 4000-kw Westinghouse generator. It will replace a 25-year-old generator set which produced 1000 kw. The new unit, according to Walter Spurling, general manager, will boost the plant's total capacity to 20,000 kw. It is being installed to meet the steadily increasing demand for electricity which doubles about every 10 years. Bermuda, only 700 miles from New York City, is Britain's oldest self-governing colony. Its 40,000 residents live on an island about 20 miles long by two miles wide. They entertain more than 100,000 tourists each year.

Moving and installing 200 tons of machinery has aroused considerable interest in Bermuda, and has introduced a number of unusual problems. Cranes, trucks, graders, warping equipment, and an abundance of manpower all have been employed. The crankshaft weighs 28 tons, and one of the giant mufflers weighs 11½ tons.

## Molykote Bulletin Available

A bulletin which describes Molykote, a general purpose grease with extreme bearing pressure properties, may be obtained from the Alpha Molykote Corp., 65 Harvard Ave., Stamford, Conn.


After 30,000 hours Koppers Piston Rings still maintain "excellent" compression

At the Neodesha Municipal Power Plant, Neodesha, Kansas, Koppers Piston Rings are an important part of the 1750 bhp. Nordberg Duafuel Engine illustrated above. After 30,000 hours of operation the pistons on this engine have never been pulled, and compression is still excellent. It is interesting to note that this Nordberg Engine, equipped with Koppers Piston Rings, has been in operation over 98% of the time—and carries about 90% of the plant load.

Koppers has widely experienced engineers and extensive manufacturing facilities which combined can fill the most difficult of piston ring requirements. Next time you are concerned with piston rings or sealing rings, whether in replacement or new installations—in engines large or small—call on Koppers. Never any obligation, of course. For more information, mail coupon.

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# AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY **MERRILL C. HORINE**

**Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.**

## RESIDUAL FUELS FOR AUTOMOTIVE ENGINES?

SINCE economy of fuel is far and away the principal attraction of the diesel engine to automotive users, anything which seems to threaten this economy is viewed with consternation. By the combination of increasing cost at the refinery and radical increases in taxes at the pump, the price of diesel fuel is rising. There is even some talk of scarcity in the future. It is natural, therefore, that other possible fuels should be looked for in the hope of reducing the price per gallon. Currently the so-called residual fuels are being given close attention; but results for automotive purposes so far are far from encouraging.

One railroad engineering representative at a recent meeting testified that experiments with residual fuel on a diesel locomotive had shown that, after a little over 16,000 miles, the fuel saving had amounted to $350, while the overhaul of the engine necessitated in consequence cost $5,000.

Like some lunch-wagon coffee, there are several cuts from a barrel of petroleum, with gasoline at the top, followed by the distillates, of which diesel is one, then the residuals and finally the dregs—tars and waxes. In the years before the second World War, gasoline accounted for about 20% of the barrel of crude, with distillates including kerosene, diesel fuel and household furnace oil, 40%, leaving residuals, such as bunker oil, at about 37%, and tars, waxes, etc., 3%. Today, gasoline accounts for 50% of the yield, thanks to catalytic cracking, and blending processes, this increase having been attained largely at the expense of the distillates.

Quality in diesel fuels has become increasingly expensive to maintain, since the greater quantity of distillate converted into gasoline has deteriorated the base distillates and has made more costly processing and the use of additives essential. Refiners say frankly that it will be difficult to supply diesel fuels of the quality which engine manufacturers specify, in the increasing quantities which the gaining popularity and intensiveness of use of automotive diesels demand—particularly in the face of the growing demand for household heating oil.

Already operators of large stationary diesel plants are shifting to the heavier residual fuels and instances of satisfactory results are being reported. The railroads, who are among the largest users of diesel fuel, have been looking hopefully toward the residuals as a means of economy. Truck and bus operators, so far, although some have become disquieted by the outlook, have not so far seriously considered these heavy fuels. The manufacturers have offered no encouragement in this direction.

Refiners, however, have been active in research and experiment in an effort to construct acceptable diesel fuel from the comparatively plentiful lower fractions of the distillation process. From this has emerged a product known as cycle oil, which is the heavy residual, cut with catalytic residuum to reduce its viscosity. So far users of this type of product have found it deficient in cetane number, which is a more serious defect in high-speed automotive engines than in slow-speed marine and stationary plants, or even in medium-speed railway types. It also has been found extremely unstable in storage and to be prone to heavy, tarry deposits in the engine.

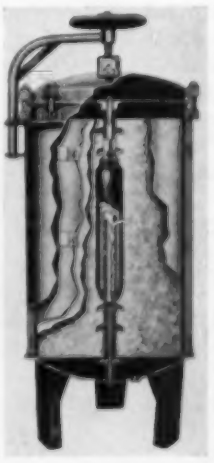
Even worse, these fuels are high in sulphur—up to 3½% and contain also vanadium, sodium and water in excessive amounts. At the elevated temperatures reached in engine operation, these impurities produce corrosive acids, such as pentoxide, sodium sulphate, sulphur dioxide and sulphur trioxide. The latter, in combination with water, produce sulphuric acid and sulphurous acid. All of these corrosive contaminants are naturally highly destructive.

Alleviation of these evils by filtration and centrifuging to remove water and insoluable solids, such as ash, silicon, and iron is only partially successful, as a residue of soluable contaminants remains. Additives to neutralize acidity and to reduce the corrosive effects of salt water are in course of development, with some promise so far exhibited.

Against this gloomy picture, it is well to reflect that intensive work toward developing satisfactory diesel fuels from the residuals has commenced only recently and that there is good reason to anticipate continued progress. Unquestionably the first general use of these doctored residuals will occur in the large, slow-speed plants, followed by the railway contingent. his may so reduce the demands for the distillate fuels that ample supplies of these may remain for the automotive market.

Doubtless so long as the inflation which now seems permanent persists, automotive diesel fuel will remain higher in cost than heretofore and may even increase. Higher fuel taxes seem inescapable. But this by no means rings the knell of the diesel. Diesel economy does not rest on fuel price alone. Higher thermal efficiency than that of gasoline engines means more miles or hours per gallon. The automotive diesel can compete with the gasoline engine even at the same price per gallon of fuel. Present engineering developments promise a continued increase in diesel economy.

### Bulk Refill Oil Filters



A new line of Honan-Crane bulk refill oil filters has been introduced by Houdaille-Hershey of Indiana, Inc. They offer low-cost depth-type filtration for applications where oil must be kept absolutely clean. An important innovation in these new models is a quick opening cover that greatly simplifies changing of refills. Covers are fastened by swing bolts which, when loosened, swing down and release cover. On smaller models, cover can be removed by one man. On larger models, a special cover lifting device raises and swings cover to one side allowing unrestricted access to refills.

For complete details about Honan-Crane Bulk Type Filters, write Filtration Division, Houdaille-Hershey of Indiana, Inc., 946 Sixth St. Lebanon, Indiana.

## Re-Equips Fleet for Diesel Operation

The first of a fleet of 200 Kenworth Cab-Beside-Engine trucks is shown as it was delivered in Kansas City, Missouri, to Yellow Transit Freight Lines, Inc., one of the Mid-West's largest highway carriers. In re-equipping their fleet for diesel operation, Yellow Transit Freight Lines selected Kenworth CBE trucks with a tractor chassis weight of 8960 lbs. per unit. The CBE tractors will be combined with 35-ft van semi-trailers for an overall length of 45 ft and a gross combination weight rating of 60,000 lbs. Power is supplied by six-cylinder, turbocharged Model JT-600 Cummins diesels. Yellow Transit's network of 8435 miles of certificated routes for general freight stretch from the Great Lakes to the Gulf of Mexico.

## Joins Micro Lube Sales

Walter Trefz

Walter Trefz has joined Micro-Lube Sales, Dallas, Texas, as technical service director. He will work with maintenance engineers and technicians in the power plant, transportation, and automotive industries. He will assist all users of internal combustion engines with problems of lubrication. Mr. Trefz is recognized as an authority on internal combustion engines and their servicing. Service engineer for one of the largest manufacturers of automotive engines—experimental and research engineers for a leading manufacturer of engine parts—Mr. Trefz comes to Micro-Lube Sales from Aluminum Industries. Micro-Lube is a patented oil purifier, that dissolves sludge and carbon and prevents varnish in all internal combustion engines.

## Diesel Rainmaker

The model D315 Caterpillar 62 hp diesel engine coupled to a 6 inch C. M. C. Rainmaster pump which has a capacity of 1200 gpm with a pressure of 75 psi.

Michel Ryecheck, a South Florida avocado grove owner, recently took delivery of a dieselized rainmaker. The equipment, engineered by Shelley Tractor & Equipment Co. of Miami, consists of a truck mounted 6-in. C.M.C. Rainmaster pump. Powered by a Caterpillar diesel engine with an output of 62 continuous horsepower, this enables Ryecheck to fully utilize the capacity of the model SS6H70 Rainmaster as it enables him to throw an inch of water over his 20 acres of "green gold" in a little over seven hours.

As drought during the extreme dry season is sometimes replaced by flood, this mobile pumping unit can also be used to pump water out of the avocado grove into one of the many irrigation and drainage canals which liberally dot the South Florida farm lands.

## Joins Kent-Moore Organization

John M. Seanor

The appointment of John M. Seanor as director of sales for the Kent-Moore Organization, Inc., was announced by J. D. Adair, president. Mr. Seanor previously served 18 years with the Stewart-Warner Corp., the last five years in charge of their original equipment sales. Kent-Moore Organization, Inc. is a leading manufacturer of special automotive service tools and equipment.


*Murray & Tregurtha*

**HARBORMASTERS**

***solve*** **tough marine power and steering problems!**

*Models from 40 to 400 h.p. (Series O-4 illustrated; 40 - 50 h.p., Gas or Diesel).*

*Steer in any direction with full power*

*Easy service and low operating costs*

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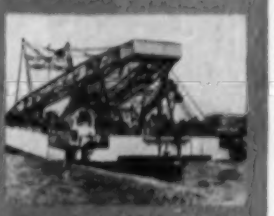

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You can solve your tough power and steering problems with Harbormaster Outboard Propulsion and Steering Units . . . the complete heavy duty marine power packages. They are quickly and easily installed for immediate use. They are efficient, economical to operate and maintain . . . and they have many special features not found with ordinary marine power, so they are the answer to many tough marine problems.

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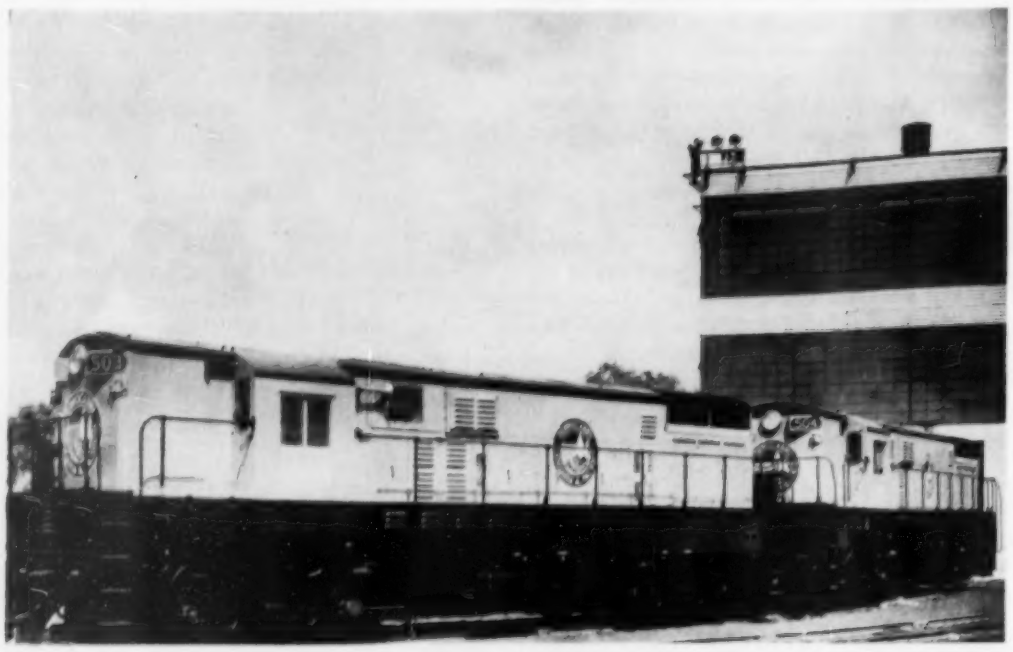
## Mexico Gets F-M Locomotive



Fairbanks, Morse & Co. recently completed delivery of six 1600-hp diesel-electric locomotives to the Ferrocarril Chihuahua al Pacifico (formerly the Kansas City, Mexico & Oriente Railway and the Nor-Oeste de Mexico Railway, combined) for use in northern Mexico. Four of these new locomotives will operate between Tunel Drake and Chihuahua, a distance of 250 miles, in both freight and passenger service. Another unit will run between Ojinago and Chihuahua, while the sixth unit will concentrate on doing switching and transfer work in the Chihuahua area.

A modern diesel shop is being constructed at La Junta, Mexico, to provide servicing and maintenance facilities for the new locomotives. Until it is completed, units are being serviced in steam locomotive shops in Chihuahua. This purchase represents the first major step in dieselizing the Ferrocarril Chihuahua al Pacifico in conjunction with the rehabilitation program currently being undertaken to modernize the entire Mexican railroad network.

## New 4-Wheel Drive Tractor Shovel

The third, and largest, of the completely new four-wheel-drive tractor-shovels to be added to the Payloader line has just been announced by The Frank G. Hough Co., Libertyville, Illinois. Designated as the Model HO, this unit has a capacity of two cu yds. An outstanding feature is the "pry-out" bucket action; 40 degrees of "breakout" at ground level.

In addition, the new HO has a newly-developed "power-shift" transmission. Not only has the clutch pedal been eliminated but the "power-shift" is labeled "complete" inasmuch as all shifts through all speed ranges in both forward and reverse can be made without coming to a stop or even slowing down. Operating cycles of larger capacity tractor-shovels are slower because heavier load requirements make it necessary frequently to shift between "working" and "travel" speed ranges. This new

complete power-shift transmission simplifies the driver's work and thus adds considerably to the speed and productive capacity of the machine.

The pry-out bucket action is accomplished by using breakout pads on the ground as a fulcrum for leverage. Opposing load forces are transferred to the ground through the pads during the breakout, instead of to the axles, wheels and hydraulic system. The 40 degrees of bucket breakout which is accomplished at groundlevel permits retaining larger heaped loads. Underslung design and position of the boom-arm gives the driver new safety and better visibility. The need for safety guards or screens to protect the driver from the boom-arms during raising and lowering operations has been eliminated. The new Payloader has greater horsepower and more weight in relation to the two cubic-yard capacity than other standard makes. It is available with a Model DWXD Hercules diesel engine. The maximum horsepower (stripped) at governed speed of 2200 rpm is 126 hp. The 6-cylinder engine has a bore of 4¼ in. and stroke of 4¾ in., giving a displacement of 404 cu. in. It drives through a torque converter. Full details and specifications may be obtained from The Frank G. Hough Co., 913 Seventh Street, Libertyville, Illinois. ITS NEW

## Industrial Visual Tachometer

Boulin Instrument Corporation announces a new light-weight visual tachometer called "Visutac," which measures rotary or vibratory speeds of machinery or objects from a distance of 3 to 50 ft. and more. The new device operates by a spring-wound mechanism which stops motion, by a stroboscopic principle. Its applications, it is reported, include accurate measurement of the speed of rotating objects having no accessible shaft ends such as drills, mixers and governors. It is also used for objects such as fans, blowers, pumps, propellers and turbines. Other uses include measurement of the speed of oscillating and vibrating objects such as pneumatic hammers, valves, and tappets. The tachometer is made in two basic ranges: 500 to 8000 and 1000-16,000 rpm-vpm. It is accurate at any scale point above the first 15% of either scale to within 2%. It requires no accessories, is simple and self-contained as a watch. Can be wound, focused, synchronized to stop motion and read at leisure. It is fully portable, contains no batteries. For details white Boulin Instrument Corp., 65 Madison Avenue, New York, N.Y. ITS NEW

## Offers Driving Handbook

Cummins Engine Company, Inc., Columbus, Indiana, has just released a fully illustrated, 64 page, 5 x 7 (pocket size), drivers' handbook, entitled "Driving Cummins Diesels." The purpose of the handbook, as stated in the foreword, "is to point out the practices that have enabled the most skilled drivers of Cummins-powered trucks to get the best performance and the most fuel mileage out of their engines. The engine will give more miles of service at less cost per mile and with more satisfaction to the driver when he adopts these practices." Cartoon style is used to tell the story of two drivers who are learning to drive Cummins-powered trucks. The booklet is available—free of charge—by contacting any of the Cummins Distributors in the United States or Canada, or by writing the Cummins Engine Company, Inc., at their main offices in Columbus, Indiana.

## West Coast Diesel News

*By* James Joseph

SANTA FE plans to enlarge its small diesel repair shop at San Bernardino, Calif., to handle annual overhauls of diesel engines used in its growing fleet of MTC (mechanical temperature control) refrigerator cars. Santa Fe currently operates 31 MTCs, has another 200 on order.

TO LONE TSAR Mining and Development Corp., Albuquerque, N.M., a 2-cylinder, 13½-hp Model 48AS3½ Fairbanks-Morse engine.

FOR WEYERHAEUSER Timber Co., Springfield, Ore., two new Model 6DAT-844 Buda Turbos for repowering LMSW Mack off-highway logging trucks. From Portland's Hamilton Engine Sales, Inc.

SOLD to Palmer-Inet Division of Leach Corp., two 125-hp Buda diesel engines to drive 50-kw Palmer alternators. Sale by Anderson-Bevier Co., Inc., of Los Angeles.

THREE Fairbanks-Morse Model 49B-4½, 100-kw diesel generating sets have been purchased by Portland, Ore.'s W. R. Grasle Co.

TO SOUTHERN PACIFIC Railroad, Eugene, Ore., a Bucyrus-Erie Model 38B, powered by a Buda 6DA-779 with Torcon torque converter.

FOR PORTLAND'S Western Transportation Co., two 6DASMR-844 Buda marine engines with Twin Disc gears and front power take-off. Engines are being installed in one of Western's tugs operating the Portland area.

DELIVERED to Seattle's Puget Sound Tug & Barge Co., a Fairbanks-Morse 1280-hp, Model 38D8⅛ marine engine.

TO SAN DIEGO'S National Steel & Shipbuilding Corp., a Fairbanks-Morse 38D8⅛, 960 hp, 6-cylinder marine diesel.

UNUSUAL is application by Lebanon, Ore.'s Santiam Lumber Co. of a 6DA-844 Buda power unit to drive a 9-ft. airplane propeller for drying hemlock prior to shipment. Propeller turns at 1800 rpm, is V-belt driven through a Twin Disc clutch on the stub shaft.

KAISER ALUMINUM & CHEMICAL Corp. announces new flatbed truck trailer, said to be first major use of aluminum for flatbeds.

READY for delivery to Kenworth Motor Corp., Seattle, a Cummins NVHBI-1200. Probable destination of this 400-hp-rated engine is as motive power for a pilot model of Kenworth's new, two-axle, 40-ton K-803 dump truck.

CUMMINS Intermountain Diesel Sales, Salt Lake City, sold 165-hp Cummins engines to Gibbons & Reed to power a rock crusher and to Charles & Ralph Taylor, Tremonton, to power a deep well turbine pump.

BEN REILLEY, Metlakatla, Alaska, purchased a 165-hp Cummins from Cummins Diesel Sales of Alaska, Seattle, to power a fishing boat.

SOLD TO THOMAS A. SHORT CO., San Francisco, a Fairbanks-Morse Model 45, 5¼ hp power uit.

LAS CRUCES, New Mexico's Smith Lumber Co. has taken delivery on a Fairbanks-Morse 6-cyl. Model 49B3½, 145-hp power unit.

TO VAN COTTEN LOGGING CO., Grants Pass, Ore., a LeTourneau Electric Wheel, powered with a Model 6DAS-844 Buda diesel, for logging along Umpqua river. Sale via Portland's Nelson Equipment Co.

FOR WEYERHAEUSER Timber Co.'s Springfield (Ore.) division, two DAT-844 Buda diesels for powering Model LMSW Macks, part of logger's 19-truck fleet operating in Springfield area. Engines sold through Hamilton Engine Sales, Inc., Portland.

UNION DIESEL Engine Co. will supply Gen. LeMay's Strategic Air Command with undisclosed number of fully automatic 3600-hp diesel generating sets, each powered by an 8-cylinder 12-in. bore x 15-in. stroke supercharged Union diesel operating at 514 rpm.

TO KAISER STEEL Corp's Eagle Mountain (Calif.) iron mine, three 40-ton capacity Kenworths installed with Cummins NHK-BS-600 6-cylinder, 300-hp diesel engines. These Kenworth K-803s are said to be among U.S.'s largest 2-axle off-roaders.

FOR PALMER-INET, three Buda engines, one driving a 5-kw Palmer generator, two working 60-kw Palmers. Sale through Anderson-Bevier Co., Inc., Los Angeles.

FOR LOG LOADING at the Long Bell Lumber operation near Scottsburg, Ore., a 6DA-970 Buda diesel with Torcon converter, purchased by Mr. Diamond Martin, Reedsport, Ore., from Eugene's Western Equipment Co.

REPOWERING an LJSW Mack is a 6-DAT-779 Buda turbo owned by Klamath, Calif.'s John Burnello & Sons, rig specialized to log hauling in the northern California woods.

TO SAN PEDRO, Calif.'s Crofton Diesel Engine Co., a Fairbanks-Morse 101½-hp model 45 basic engine, sale confirmed by C. E. Dietle, F-M's diesel division manager, Chicago.

FOR McCALL, Idaho's Brown Tie and Lumber Co. ,a LeTourneau Electric Wheel, powered with a 6DAS-844 Buda.

AT WORK for Allen Bros., Eugene, on Portland construction job are three new Allis-Chalmers rubber-tired earth removers, two TS-200s (with 6DA-779 Buda diesels) and a TS-360 (powered by a 6DS-844 Buda).


NEW LUBER-FINER INDUSTRIAL MODELS ANNOUNCED

Luber-finer

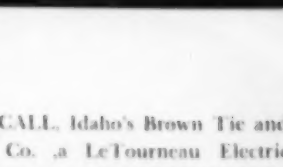
MODELS 272-C AND 363-C

FOR MOBILE • STATIONARY AND MARINE ENGINES

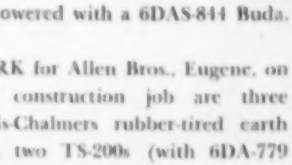
WITH UP TO 3 & 4 GALLON CRANKCASE CAPACITIES

*All Luber-finer Models may be used on engines larger than recommended; however, the Pack life will be proportionately shorter.*

CHECK ALL THESE EXCLUSIVE LUBER-FINER FEATURES



- ***SINGLE BOLT CLOSURE***—Ingeniously designed Clamping Ring utilizes Single Bolt Closure for quick, easy Pack Replacement.



- ***POSITIVE SEALING GASKET***—Long-lasting "O" ring type gasket assures leak-proof lid closure at all operating pressures.
- ***POSITIVE PACK SEAL***—An outstanding feature that eliminates the possibility of oil ever by-passing the Luber-finer Pack.
- ***DUAL SAFETY VALVES***—Prevents oil drain-back, assuring exact crankcase oil level reading at all times, stops oil from circulating through unit if lines are reversed or if the Luber-finer Unit is otherwise improperly installed.

AND DON'T FORGET!!
FOR LUBER-FINER'S ENGINEERED PROTECTION — BE SURE THERE IS A GENUINE LUBER-FINER PACK INSIDE!!

ONLY A LUBER-FINER UNIT PLUS A GENUINE LUBER-FINER PACK CAN GIVE YOU THE EXCLUSIVE PATENTED FILTERING PROCESS THAT HAS MADE LUBER-FINER THE STANDARD OF THE INDUSTRY SINCE 1936!

*Luber-finer Units are Standard and Optional Equipment on America's Leading Diesel Trucks, Tractors and Stationary Engines.*

For Complete Information Write Dept. 81

LUBER-FINER, INC., 2514 S. Grand Ave., Los Angeles 7

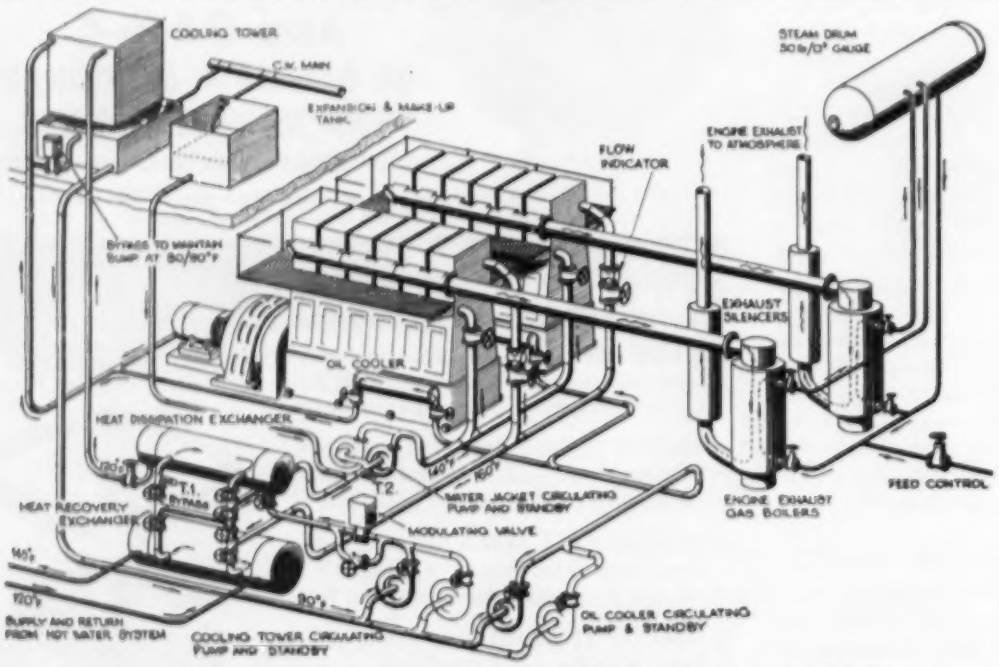
# WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **LEO WALTER**

**Leo Walter was born in Vienna, Austria, and graduated in Mechanical and Electrical Engineering from the Vienna Technical University. He served his apprenticeship in a Czechoslovakian engineering works. Later he was project engineer during construction of power and heating plants. For six years, he was Chief Engineer for Central Europe for a well-known power plant contractor. He had established himself as an independent consultant before Nazism drove him to England in 1938. During the war years, he worked for several engineering firms, but now has his own consulting office in Cheltenham. His articles have appeared in numerous engineering magazines.**

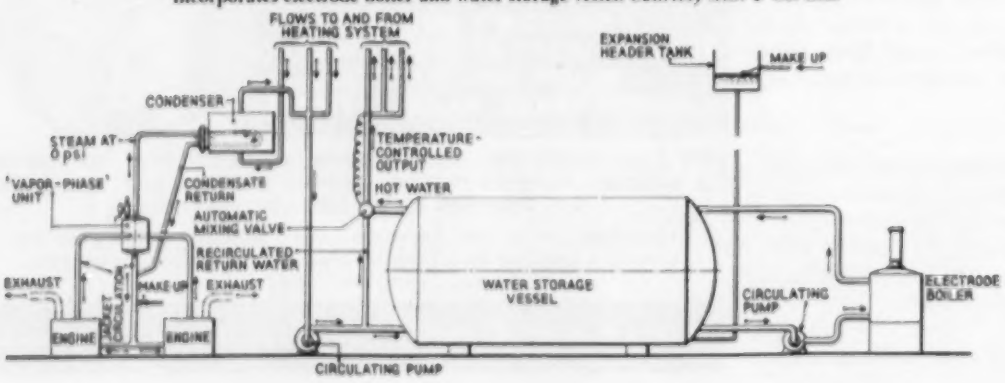
## THE UTILIZATION OF WASTE HEAT—PART II

AUTOMATIC control of cooling water temperature has become standard in recent years. Questions therefore arise as to savings possible from a combined system of automatic cooling control and waste heat recovery. While the savings on the waste heat section can be worked out readily, it is not so easy to put into figures the savings resulting from converting a hand-controlled open cooling circuit into an automatically-controlled closed circuit. The real value lies in the combination of savings which can be measured and the reduced risks which cannot be measured easily. The latter, however, include: reduced engine wear and jacket scaling troubles reduced running and maintenance costs; reduced water consumption.




**Schematic arrangement of heat recovery equipment on diesel-electric generator sets in plant of Monotype Corp. Ltd., Salford, England.—*Courtesy "The Oil Engine & Gas Turbine," England.***

**This combined thermal storage and waste heat recovery system with Vapor-Phase unit incorporates electrode boiler and water storage vessel. *Courtesy Aish & Co. Ltd.***

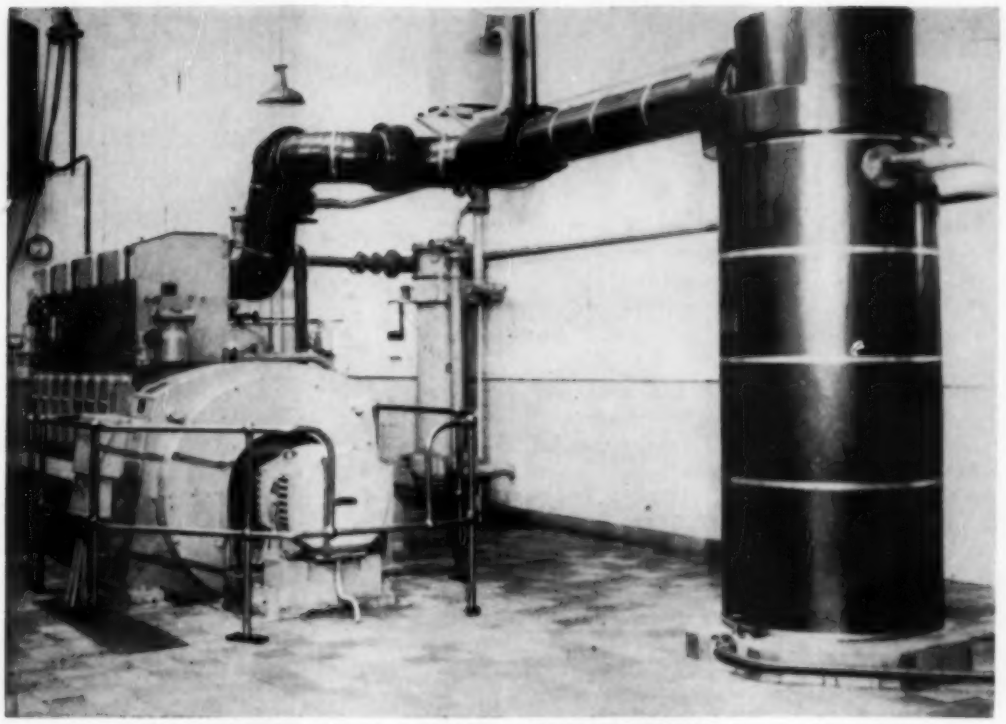



Savings from recovery of waste heat from the engine exhaust gases can be calculated by this formula: Brake horsepower times weight of exhaust gas BHP/HR times permissible temperature drop divided by four. The figure four is constant—the average specific heat of the exhaust gases is 0.25.

As an illustration, take a relatively small diesel which develops 88 bhp at full load. You multiply 88 times 12 times 500 and divide by four. The result: 105,600 BTU/HR from the gases. Add to this the heat in the jacket water. It will be about 200,000 BTU/HR or less. The two together, then, are about 300,000 BTU/HR under full load. Allowing for intermittent working, we can safely say that the heat recovered will be at least one million BTU a day. Under average conditions, one pound of coal will give 7000 BTU at the boiler. Therefore, your savings is the equivalent of 3171 pounds of coal in a month.

A large electricity generating plant in England, driven by diesels with a total of 3550 bhp, had a waste heat recovery scheme designed to provide 51% of the winter heating requirement and all of the summer load. It is estimated that without the heat recovery there would have been a 50% increase in fuel consumed.

Waste heat is recovered in the form of steam at a pressure of 160 psi in a diesel electric generating plant. The steam is used to drive a 250-kw dynamo to increase the electrical output of the station and thus improve the thermal efficiency. At a large London store, all the waste heat possible is recovered from the diesel installation. This is done by circulating the cooling water in a closed circuit through: lube oil heat exchangers; engine jacket water heat exchangers; and waste heat hot water boilers. The water heated by the heat recovery equipment attached to the engines averages 900 gph with a temperature rise from 60 to 177°F with 255 kw of electrical load. This represents a heat recovery of more than 36% of the fuel used in the engines. After taking into account the heat units



**Mirrless diesel engine and waste heat boiler in the Hope textile mill, Darwen, England.**
***Photo courtesy Mirrless, Bickerton & Day, Ltd.***

in the current generated, the total thermal efficiency is around 70%.

An interesting waste heat recovery plant is in operation at the Monotype Corp. Ltd., Salford, England. The layout of this plant is shown in an accompanying perspective drawing. Two English-Electric diesels, 15x20 in., with an output of 750 bhp at 375 rpm turn the generators. A thermo-syphon system connects two waste heat boilers to a main steam and water drum at a gallery, supplying hot water for the canteen cooking and cleaning. Additional steam requirements during the summer are met by a Clarkson oil-fired boiler. About 2000 lbs/steam/hr can be produced by the two waste heat units plus the direct fired boiler. At full load, the jacket water is passed at 160°F through a heat recovery exchanger. A dissipation exchanger is provided for use when the recovery exchanger is not in service. A by-pass maintains temperature at the cooling water sump between 80 and 90 degrees F.

The accompanying photograph shows a Mirrless diesel engine with waste heat boiler installed in a Lancashire Mill at Darwen, England. The boiler produces hot water for process. It is noteworthy that Great Britain textile mills are utilizing diesel waste heat much more extensively than before World War II. In many mills it is possible to provide auxiliary oil or gas firing of an exhaust steam boiler, thus increasing steam generation when desired. Composite boilers also are available that have an oil-fired center and an exhaust-heated outer section. Another possibility is to include electric immersion heaters in the water space of an exhaust boiler. At times of low electric energy demand, the surplus current from the driven generator then can be utilized to increase steam production. About six pounds of steam can be raised this way per every pound of fuel oil used by an engine. And these electric immersion heaters can be brought automatically into action.

There are benefits to be gained from the use of a Vapor-Phase system in addition to the obvious one of waste heat recovery. For example, automatic temperature control is an inherent feature and the system is extremely suitable for tropical duties owing to the greater difference between the coolant and the ambient temperatures. Also, the high working temperature prevents cylinder condensation, so that gaseous fuels containing sulphur compounds can be used without scrubbing, and lubricating oils remain free from sludge for longer periods with a consequential reduction in wear. An actual installation in Poole at Aish & Co. Ltd. is shown diagramatically on this page. It comprises a conventional thermal storage system—incorporating a 250-kw electrode boiler—in combination with Vapor-Phase waste heat recovery from two 27-bhp Lister diesel alternator sets.

## Oakland District Manager

**Pictured from left to right: R. A. Legge, retiring district manager of International Harvester; L. A. Hanson, regional manager, and M. T. Sprague, new district manager.**

International Harvester has announced the appointment of M. T. Sprague as district manager of the Oakland, California Motor Truck District. Mr. Sprague comes to Oakland from Portland, Oregon Motor Truck District where he has been district manager. He replaces Roy A. Legg who has retired after 39 years of service.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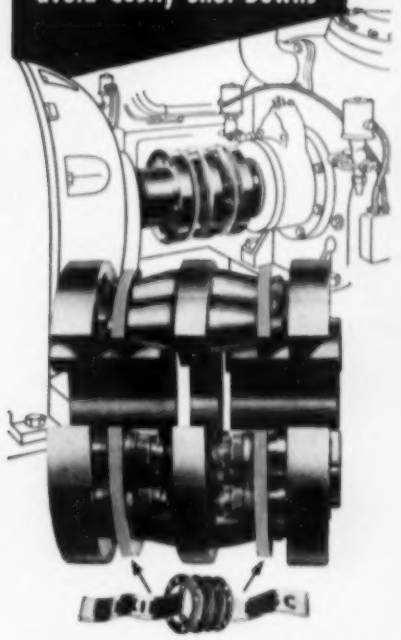

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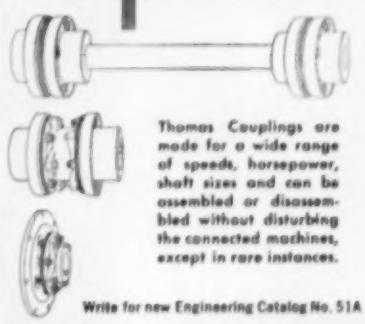

Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

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# THE AEROPRODUCTS HYDROSTARTER

A new hydraulic starting system for diesel engines is in production by Aeroproducts Operations of the Allison Division of General Motors. Called the "Hydrostarter," the system consists of a hydraulic motor, a piston-type accumulator, an engine-driven pump, a reservoir and a manual pump. No outside source of energy is needed. After the accumulator has been loaded and sealed with an inert gas, an engine-driven pump maintains pressure and the manual pump permits emergency recharging.

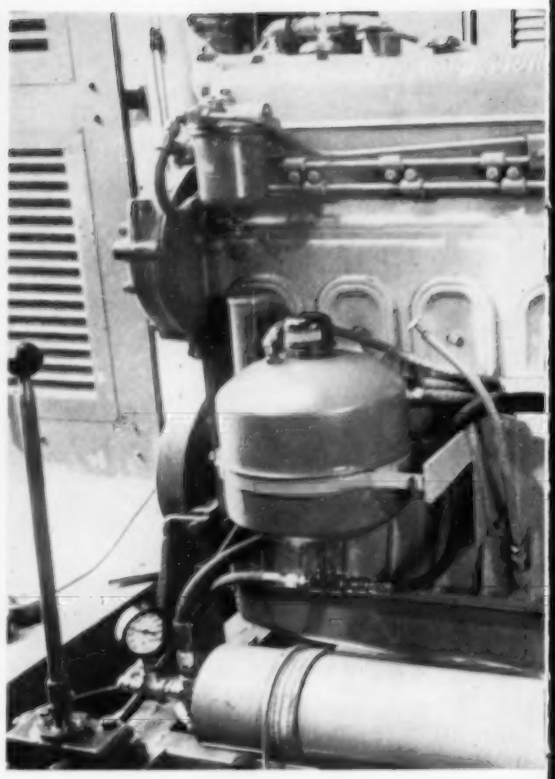
The "Hydrostarter" was specially engineered to operate in remote installations where cold weather and frequent periods of equipment inactivity can be detrimental to conventional electrical starting equipment. Temperature has little effect on the new starter. In laboratory and field tests at subfreezing temperatures, "The hydraulic unit's high torque and fast acceleration provides engine speed far beyond present normal starting speeds in less than one half second," according to R. E. Lynch, Aeroproducts manager. "The starter's high static torque, 80 ft. lbs. at 3000 psi working pressure, also delivers top performance under extremely adverse conditions, since torque output is not appreciably affected by temperature."

The starter can eliminate the need for heavy-duty electrical systems. The compact motor extends slightly more than nine inches from the engine flywheel housing and can be installed by the average mechanic. It can be coupled to practically all diesel engines up to 300 hp in the same way as a conventional electric starter. It may be used on engines operating cranes, winches, shovels, drag lines, locomotives, ships, trucks, tractors, and on such off-highway equipment as road graders, rollers and compactors.

"The 'Hydrostarter' will realize substantial savings for diesel engine operators in its economy of operation," Mr. Lynch asserted. "It conserves space and weight, requires no outside energy sources and is easily installed."

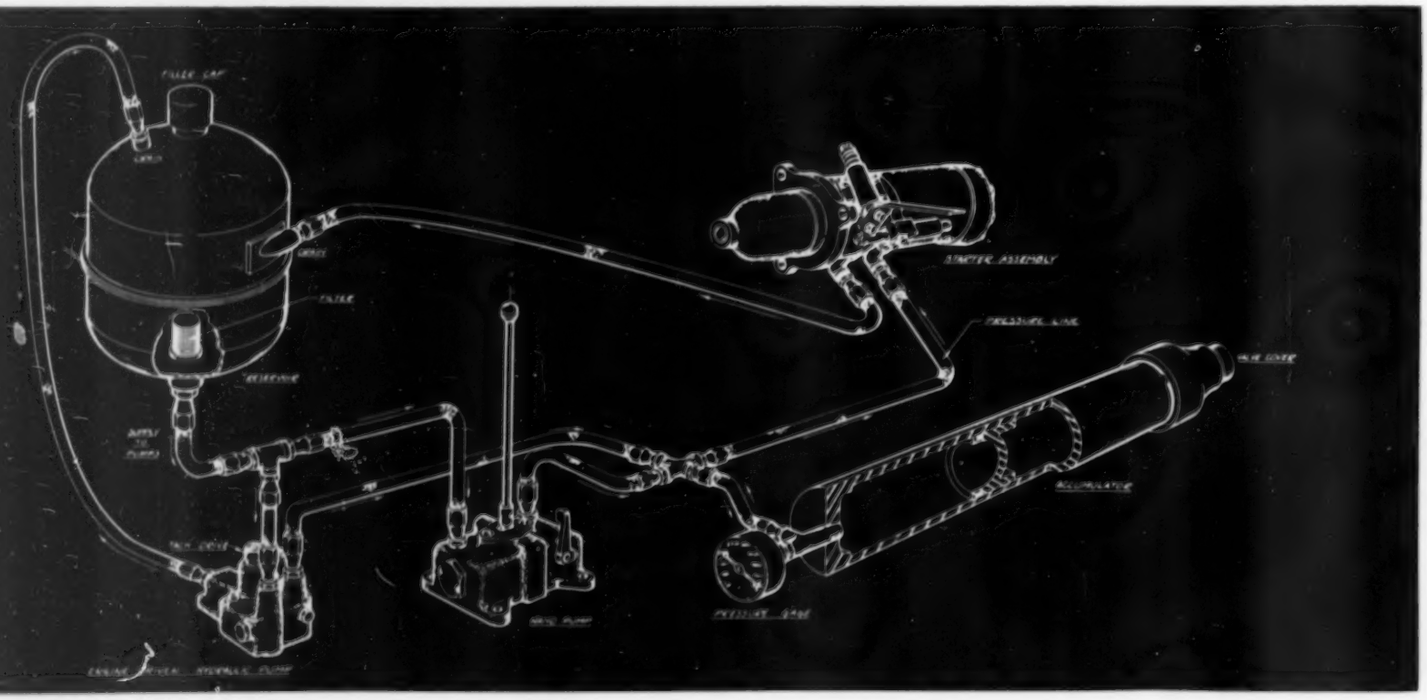
The hydraulic cranking motor is a multiple cylinder "Z" crank design, operating at a pressure of 1200 to 3000 psi with a displacement of 2 cu. in./rev. The 7-cylinder rotor is mounted in needle bearings and rotates against a valve plate which provides proper porting of hydraulic fluid. The pistons operate against the inner race of a ball bearing angularly mounted in the end shell to give cranking action. High pressure fluid, admitted to the pistons by the valve plate just after top dead center, causes the pistons to push against the crank bearing. This causes the rotor to turn as the pistons ride around the inner race of the crank bearing, moving outwardly seeking the low side of the crank. At bottom dead center, the cylinders are connected to drain through the valve plate, allowing the pistons to move back into the rotor as they come up to top dead center.

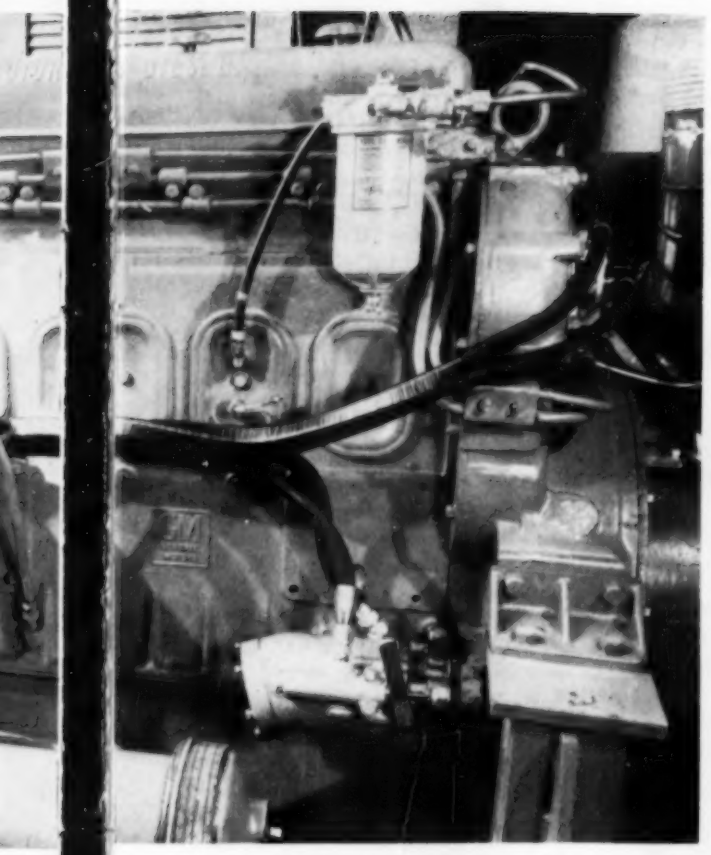
The rotor is splined to the output shaft which in turn carries a drive pinion and an over-running clutch. An operating handle on the side of the

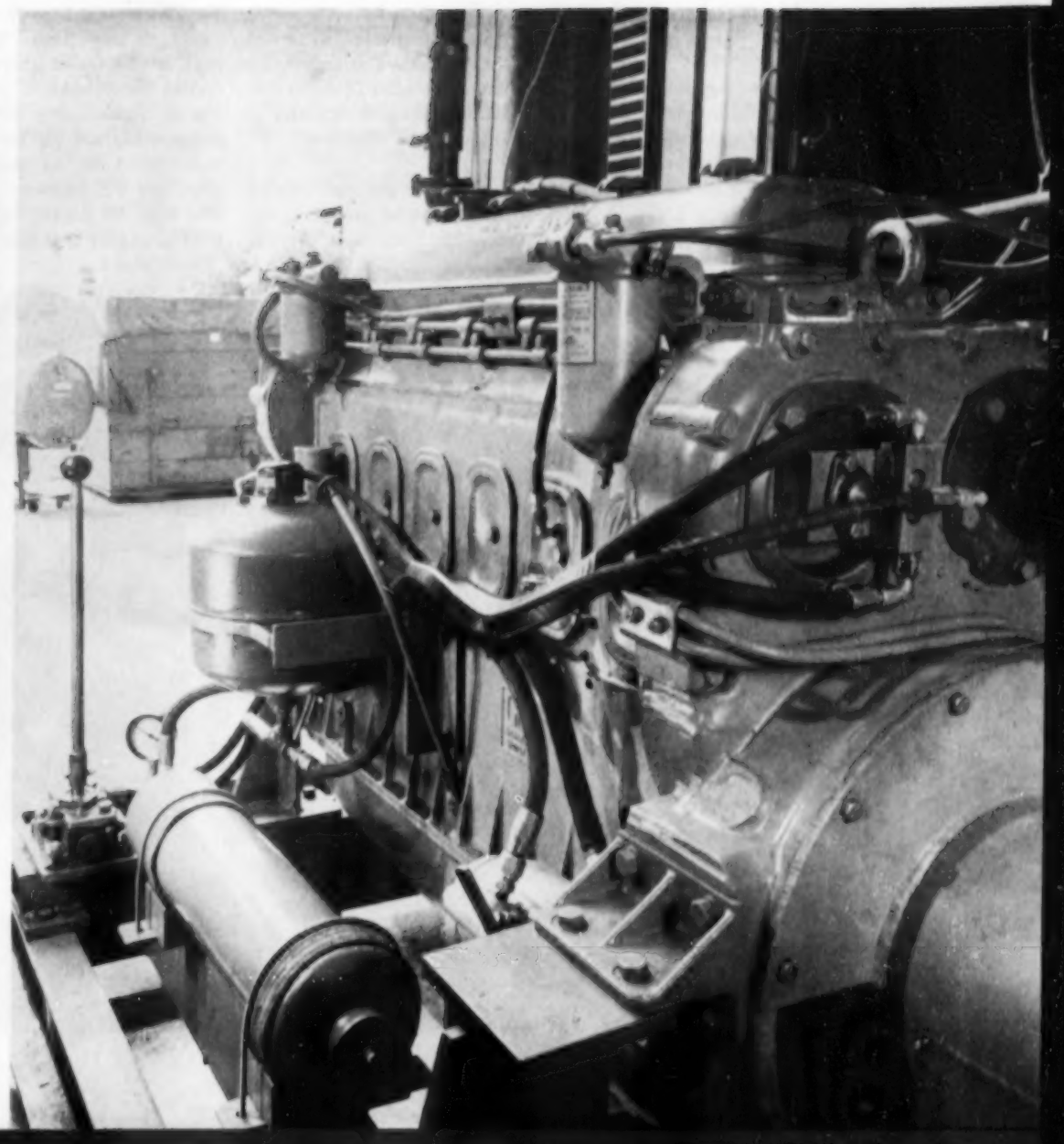


motor operates a shifting fork for engaging the output pinion with the flywheel and also operates the control valve. Through this lever, mechanical timing is obtained between the output pinion and the control valve. This timing prevents admitting full flow of fluid to the cylinders until the pinion is properly engaged and at the same time provides a "bleed" amount of fluid to rotate the pinion slowly when necessary to effect engagement with the flywheel. With the pinion engaged, full travel of the lever admits full flow of fluid to the cylinders through the valve plate for maximum torque.

**Parts and flow of the hydraulic fluid in the non-electric starting system of the Hydrostarter are diagrammed below.**



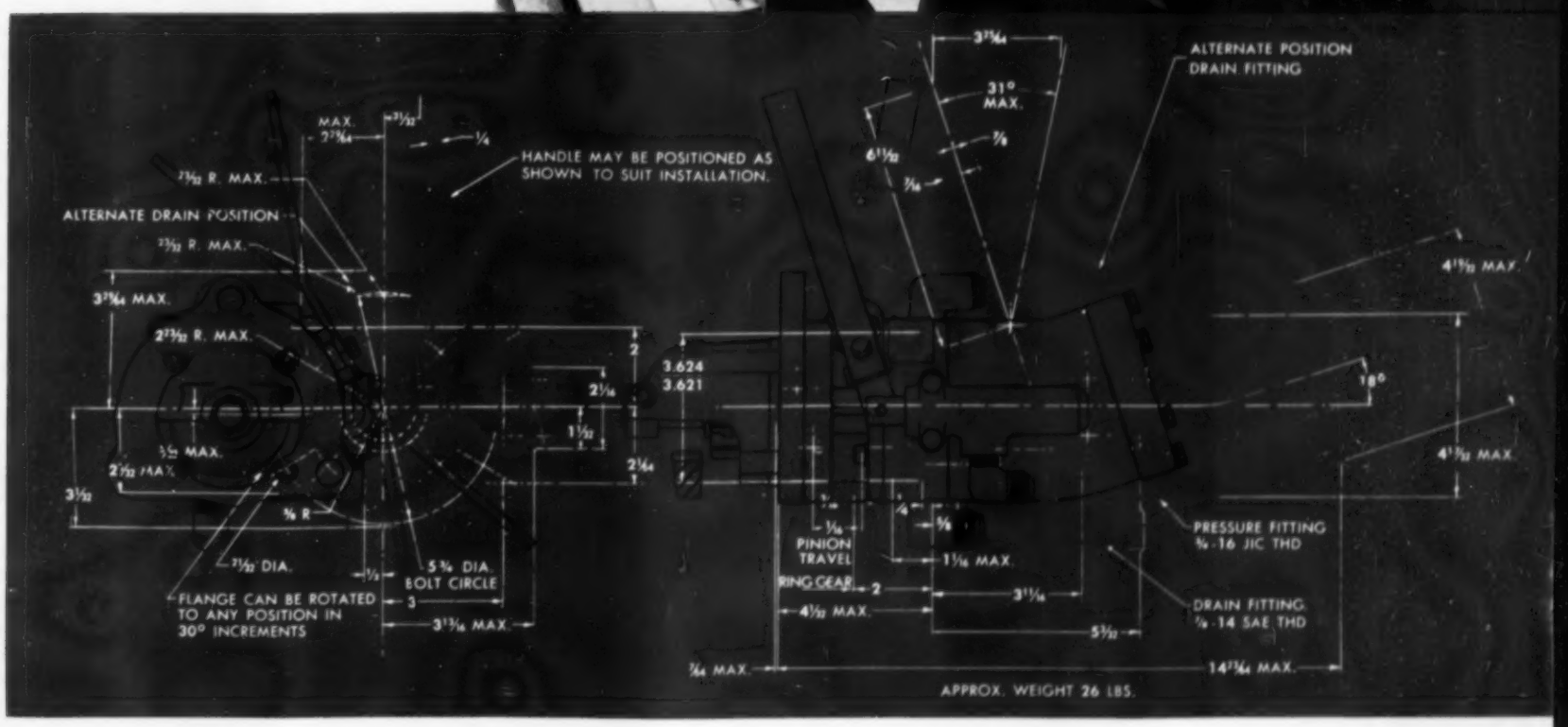




Above and at right are two views of the Hydrostarter mounted on a G-M Detroit Diesel 6-71 engine. The unit mounts on the flywheel housing in the same manner as an electric starter.

The system consists of a hydraulic motor, a piston-type accumulator, a manually-operated pump, an engine-driven pump and a reservoir. The hydraulic motor is adaptable to a high percentage of of engines with SAE mounting flanges.

The dimensional diagram below will show the amount of space needed to make a simple installation of a Hydro-starter.



## Straws in Today's Business News

DIESEL engines and torque converters both were subjects of comprehensive articles in "Business Week," Sept. 10, 1955. A report of GM's Powerama was the occasion for surveying the diesel industry and predicting for it a bright future. The torque converter article apparently was inspired by the growing recognition of the importance to various industries of this method of transmitting power. Mention was made of the increasing competition among the handful of firms who manufacture converters.

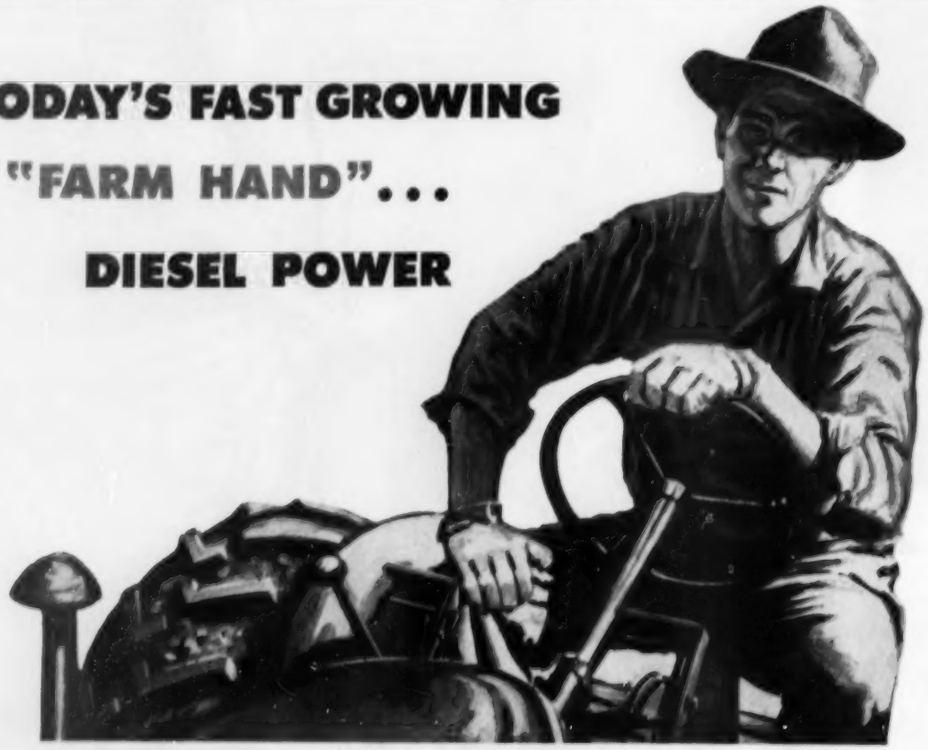
RUMORS have come and gone through the years that Hall-Scott Motors, Berkeley, Calif., would build diesel engines. The rumor soon is to become fact, according to press releases from the company that has built high-quality gasoline engines for 40 years. A diesel truck engine of approximately 200 hp has been designed but not yet built. It will be built, tested in the shop, and then tested on the highways before being offered to the market. One guess is as good as another as to how long this will take. Right now, Hall-Scott management is engrossed in assimilating two firms recently acquired in a comprehensive diversification program. First addition was Bardwell & McAlister, Burbank, Calif., a firm making electronic instruments for guided missiles, radar, and highly classified projects for the government. In September, Hall-Scott also purchased Dynamic Analysis Co., Los Angeles, maker of a desk model electric computer. Laurence H. Cooper, Hall-Scott president, heads the aggressive new management group that took over after last year's "spin-off" from ACF-Brill Motors Company.

A DAM to cost $43.6 million will be built in booming Venezuela. A Chicago bank will be among those who will finance the project, and the Export-Import Bank will guarantee up to $4.1 million of the bank's participation. . . . The Export-Import Bank also has extended credit lines to three U.S. manufacturers to finance sale abroad of American-made machinery. Credit of $10 million was extended Caterpillar Tractor Co., $1 million to Continental Supply Co., Dallas; and $100,000 for sprinkler irrigation systems to Wade & Co., Portland, Ore. . . . Eimco Corp., Salt Lake City manufacturer of dieselized construction equipment, received a $800,000 credit to help finance export sales. . . . Clayton Manufacturing Co., Del Monte, Calif., was granted a line of $200,000 credit to finance sale of various products, including dynamometers.

ASSOCIATION of American Railroads reports that on Sept. 1 the backlog of new locomotives ordered by Class I roads stood at 704, all of which were diesel-electric excepting 12 straight electric. A year earlier 103 locomotives were on order, but in May 1953 the backlog was 869. . . . The Santa Fe plans to add 69 diesel locomotives to its fleet between now and August, 1956. There are to be nine 7000-hp freight and 32 1750-hp road switchers from Electro-Motive Division of GMC; 10 2250-hp road switchers from Alco Products; and 18 yard switchers of 1200-hp from Fairbanks-Morse. . . . The Pennsylvania has just sold trust certificates to help finance purchases which include 50 new 1750-hp diesel-electric locomotives. An order for 21 all-purpose locomotives was given Alco Products which will bring Pennsy's total to 2055 diesel units. The order involves about $3.3 million; 16 engines are to be 1600 hp and five will be 2400 hp.

GENERAL ELECTRIC will start delivering new locomotives in May to Manila Railways in the Philippines. Forty diesel-electrics worth about $5 million are involved. Thirty will be 1200-hp road units, 10 of them for high-speed passenger service. Ten units will be 500-hp


TODAY'S FAST GROWING "FARM HAND"... DIESEL POWER



In ever-increasing numbers, farmers are turning to Diesel power—for tractors, combines and other types of farm equipment. A majority of these farm Diesels, with their great labor-saving and money-saving advantages, are equipped with American Bosch fuel injection systems.

The pump that helped make this impressive swing to Diesels possible was the American Bosch PSB. This simplified single-plunger injection pump gave Diesel manufacturers the pump they needed to produce the smaller lower-cost Diesels that are making such a mark in the farm equipment, and other fields.

American Bosch now has produced over 100,000 PSB's in just the few years since it was introduced. During this time, the PSB has achieved a remarkable record for performance and dependability under the most severe operating conditions. American Bosch, Springfield 7, Massachusetts.

3292

AMERICAN BOSCH
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Here are some of the farm equipment manufacturers who rely on American Bosch Diesel Fuel Injection Equipment:

Allis-Chalmers
Case
Cockshutt
John Deere
International Harvester
Massey-Harris
Minneapolis-Moline
Oliver

for yard switching. . . . The Milwaukee Road is purchasing 44 diesel locomotives for around $8.5 million. Twenty-eight have been ordered from Electro-Motive, eight from Fairbanks-Morse, and eight from Alco Products. Eighteen are for passenger runs and the rest for road switchers. . . . New Orleans Public Belt Railroad has ordered two 1200-hp diesel-electric switchers from Baldwin-Lima-Hamilton Corp.

FAST-GROWING Pacific Intermountain Express recently placed orders for $3.75 million in new equipment with four companies: Kenworth Motor Truck, 10 dromedary tractors and 10 tank-trucks; Peterbilt Motors, 10 dromedaries and 10 tankers; Strick Co., 40 aluminum flatbed trailers and 95 roll-top trailers; and Fruehauf Trailer Co., 100 Hi-Cube and 25 tank trailers. . . . Another large West Coast motor carrier aspires to grow even larger. Consolidated Freightways seeks permission to buy Utah-Arizona Freight Lines, R. A. Conyes Tank Line, San Pablo, Calif., Arrowhead Freight Lines, Los Angeles, and Wheeler Transportation Co., Menasha, Wisc., to mention only the largest o fthose with whom Consolidated executives have been dickering. Consolidated's gross transportation revenue in 1954 was $37.3 million.

NAPCO Industries, Inc. is moving its Federal Motor Truck Division from Detroit to Minneapolis. The 45-year-old truck firm was acquired by Napco about a year ago. Max E. Rappaport, Napco president, expects the truck division to do an annual volume of $10 million. He said the new plant will produce parts, standard and special trucks up to 26 tons as well as cranes and tractors. Production of Federal trucks in a factory near Ankara, Turkey will start about the first of the year. . . . Warner & Swasey plans to purchase Duplex Truck Co., Lansing, Mich. Recently, Duplex has been producing undercarriages for Warner & Swasey's Gradall ditch-diggers. It also builds engine generator sets and specialized trucks for industrial and maintenance service.

CLARK Equipment Co. is opening a West Coast branch in the San Francisco Bay Area to assemble fork lift trucks and to give service and overnight deliveries west of the Rockies. . . . AC Spark Plug Division, GMC, is adding another building at its Flint, Mich., plant. The additional 250,000 sq. ft. of floor space will boost the total to 2.5 million sq. ft. Besides spark plugs, the Division makes automotive oil filters, air cleaners, and instruments for cars.

DRAVO CORP., Pittsburgh, has acquired from DeLaval Separator Co., Poughkeepsie, N.Y., the latter's mill lubrication department. Located in Pittsburgh, it will become a part of Dravo's machinery division and will complement Dravo's services in the fields of mechanical construction, mill equipment, piping and pumps.

WESTCOAST Transmission Co. started work in October on a section of the $162-million pipeline which will deliver natural gas into Vancouver, B.C., and to the Pacific Northwest Pipeline Corp., 100 miles east of the city. . . . Transcontinental Gas Pipe Line Corp. recently was granted permission to expand facilities, at an estimated cost of $3.4 million, to deliver 10 million cu. ft. more gas a day to the Sun Oil Co. refinery in Marcus Hook, Pa. . . . Trans-Canada Pipe Line Ltd. has Dominion approval to build the Toronto-Montreal link of the long-debated natural gas line planned to connect the producing fields of Western Canada with the industrial areas of the eastern provinces.

**IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections.**


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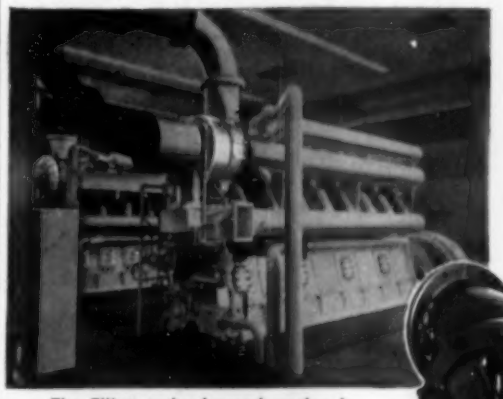
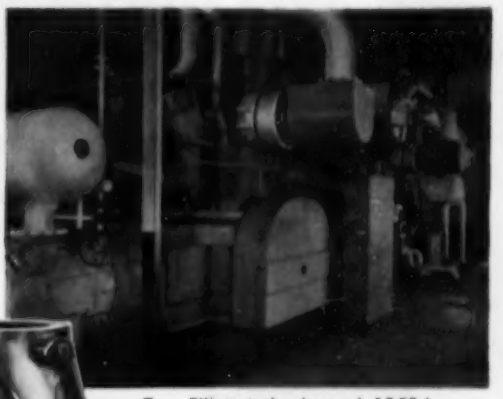
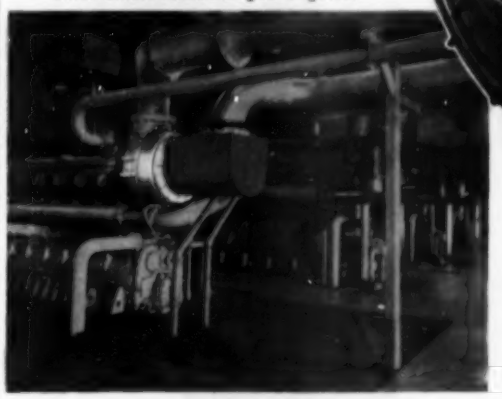


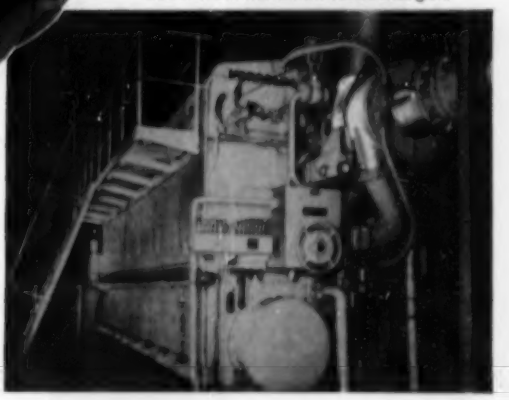
The Elliott turbocharged engine in the foreground is a recent addition in this municipal plant. Earlier Elliott model in background.



Two Elliott turbocharged 1350-hp engines on the job in a natural gas company pipe line station in the Southwest.

Elliott turbocharger in modern municipal plant. In the rear are three other Elliott turbocharged engines.





This 2120-hp engine in a diesel-generating power station gets a boost from the Elliott turbocharger.

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It has been proved that turbocharging improves almost any diesel engine. It permits the engine to deliver more horsepower at lower fuel consumption. But be sure the turbocharger is an Elliott—the turbocharger backed by fifteen solid years of experience. Hundreds of thousands of hours of reliable operation in more than 12,000,000 hp of Elliott turbocharged engines on railway, marine, on-and-off highway trucks, stationary and heavy duty construction service stand behind today's product. It pays to specify Elliott turbocharging whenever you invest in diesel powered equipment. For complete details, write Elliott Company, Supercharger Department, Jeannette, Pa.

**ELLIOTT Company**

## Florida Diesel News

*By* Ed Dennis

IN HIALEAH, Food Fair's new food warehouse will have for its standby power, two D397 Caterpillar generating units with Columbia 300-kw generators, Young heat exchangers and Burgess-Manning exhaust snubbers. Installation was engineered by Steve Darlington of Shelley Tractor and Equipment Co.

SUPER TEST Oil Co., Tampa, took delivery of a GM 6-71 dieselized hi-way tanker and Canada Dry Ginger Ale Bottling Co. of Florida also received a GM 6-71 truck.

FLORIDA-GEORGIA Tractor Co., Miami, recently delivered to R&J Emmonds of North Miami a Drott loader with a TD9 International diesel while Blyth Bros. received a TD24 International dozer tractor.

DIESEL SHIPBUILDING Co., Atlantic Beach, has sent into the marine field the M/V *Ponte Verda*, a 75x22-ft. all-steel vessel, powered with a GM 6-110 diesel and a 3-kw Onan diesel generating set.

CUMMINS Diesel Engines of Florida repowered from a gasoline engine to a JBS-6 Cummins diesel a highway tractor for Lonnie Wingate of Tampa. Two JBSs also went into tractors for Mercury Motors Express Co., Tampa.

MADERERA-BABUN S.A., Santiago, Cuba received two D6 Caterpillar diesel tractors.

IN JACKSONVILLE, Florida Diesel Engine Sales repowered the *Little Doc*, a party fishing boat, with a GM 4-51, Paragon 2:1 r&r gears. Cost of a day's fishing trip dropped to $2.35 as compared to $14.00 for the old gasoline engine installation.

FLORIDA-GEORGIA Tractor, distributors of International Harvester dieselized equipment, has moved to its new and modern shops and offices at 15151 West Dixie Highway, North Miami Beach. J. F. McCoy is Vice President and General Manager.

AT LAKE PLACID, the Reynolds & Smith Co. took delivery of a Caterpillar D8 tractor, while down at Homestead, Florida, Sundeck Homes received a D4 bulldozer. Both were delivered by Shelley Tractor & Equipment Co.

A FAIRBANKS-MORSE 6-cylinder, 100-hp diesel generating unit recently was installed at the Container Corp. of America, Fernandina Beach.

FOR USE on the new Sunshine State Turnpike, a 21-cu. yd. Euclid scraper, pulled by a GM 6-110 powered tractor. Four more will be on the job in the near future, supplied by Llewellyn Machinery Corp., Miami.

FLORIDA DIESEL Engine Sales, Miami, supplied a 150-kw Delco-Remy generating set powered with a GM 6-110 diesel engine for Stevens Super Market. A GM 4-71 diesel also was sold for pumping oil on a Belcher Oil Co. barge.

RECENTLY delivered Cummins dieselized equipment for Florida includes a Model NHRIS-600 rated 300 hp in a Baldwin-Lima-Hamilton crane for Hutson Pulp & Paper Co., Palatka; while Anderson Trucking Co., of the same town, received a HRB-600 Cummins.

THE CITY of New Bern, N. C., received a Model 38F5¼ diesel generating set, 300 hp, from Fairbanks-Morse.

AN INTERNATIONAL Harvester tractor, Model TD18, was recently delivered to Ted Anderson of North Miami who also received a TD6 dozer from Florida-Georgia Tractor Co.


Massey GOVERNORS

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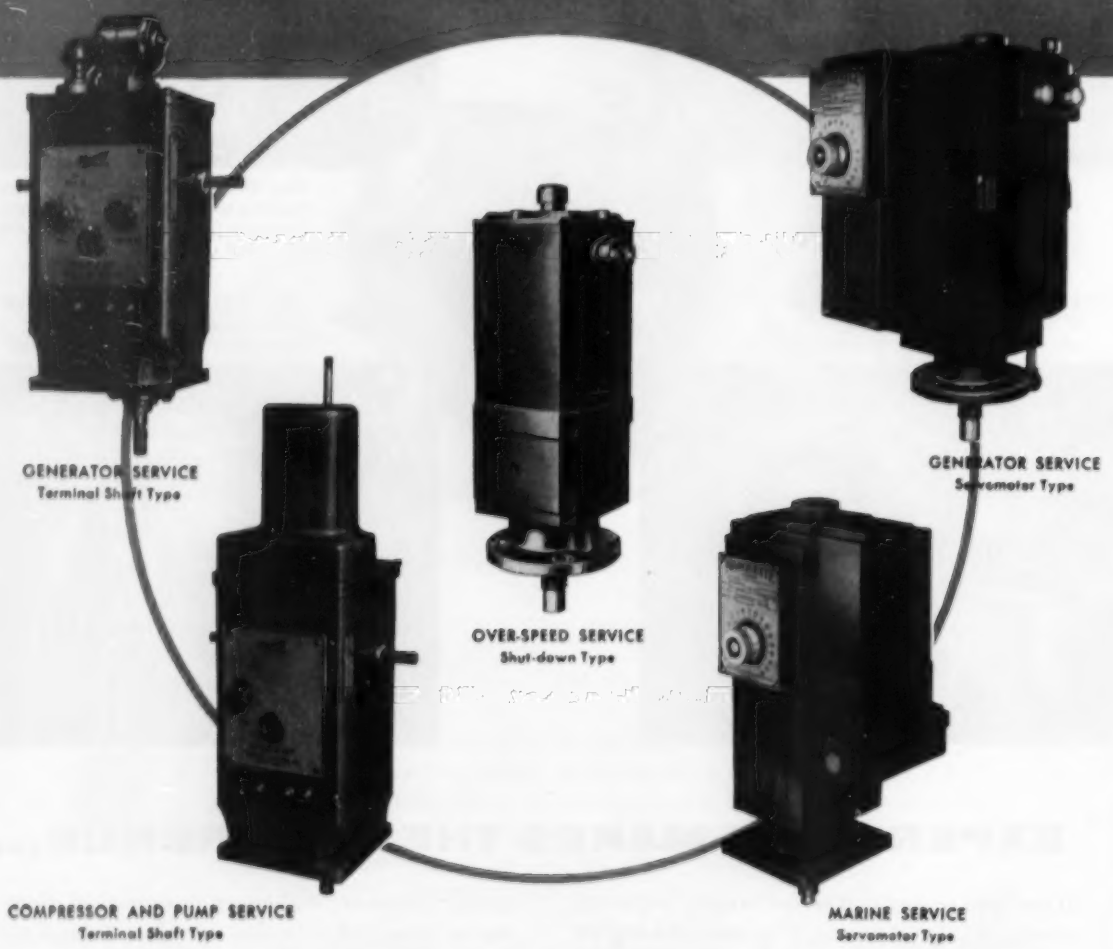


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SUBSIDIARIES OF CURTISS-WRIGHT CORPORATION

## New Orleans Diesel News

*By* James W. Calvert

TWIN GM diesel engines, Model 6-110, will be installed in the 65-ft. steel tug being built for Joe Franicovich of Buras, La., by Bryant Boats, Inc., Bayou LaBatre, Ala. The engines were supplied by George Engine Co., New Orleans.

THE TUG *Elmore,* owned by Jackson & Hope Towing Co., Mobile, has been repowered with a Cooper-Bessemer diesel engine, Model JS-8-DRT, 8-cylinder, 4-cycle, supercharged with after cooler. The engine is rated 1100 hp at 400 rpm. Cooper-Bessemer's New Orleans branch office handled the transaction.

ROGERS Diesel Engineering Co., New Orleans, has been given the Louisiana distributorship for the line of Murphy diesel engines.

ARTHUR DUVIC'S Sons, New Orleans, recently sold an Atlas diesel engine, Model 3552X6, rated at 1200 rpm, to Gulf Coast Towing Co. for repowering the tug *Commander.* The 65-ft. tug with its new engine is now pushing 32,000 barrels of oil on the Intracoastal Canal.

THE HEBERT & Guidry Towing Co., Houma, La., powered its new tug *HG-1* with twin Superior diesel engines, Model 40-M5-8, direct reversing, rated 450 hp at 900 rpms. The engines and auxiliary equipment were sold by Arthur Duvic's Sons, New Orleans. The 65-ft. tug is equipped with two 15-kw Lister ac generating sets, Columbian bronze propellers, pilot house control, and an all-electric galley.

REAGAN Equipment Co., New Orleans, supplied two Waukesha diesel engines, Model WAKDBS, for driving twin 125-kw Electric Machinery generators for the Kerr-McGee shallow water oil drilling barge No. 35.

ROWAN Drilling Company's new offshore drilling barge, now under construction at Avondale Marine Ways, New Orleans, will be equipped with three Waukesha diesel engines, Model WAKDBS, to drive the 125-kw Electric Machinery generating sets. The engines were sold by Reagan Equipment Co.

REBSTOCK & Reeves, drilling contractors of New Orleans, have purchased three Waukesha diesel engines, Model LRDBS, for furnishing main power on a Wilson compound for an offshore drilling barge. The turbocharged units are rated 570 hp at 1200 rpm. The rig also is being equipped with one Model 148 DK Waukesha diesel engine for powering a Wilson coring reel, and two of the same model to drive two 75-kw Electric Machinery generators. This model is a full diesel engine rated 200 hp at 2100 rpms, with aluminum pistons, counter-balanced crankshaft with vibration dampener.

REAGAN Equipment Co. has sold a Waukesha diesel engine to Rebstock & Reeves, oil drilling contractors, to drive a Bethlehem mud pump. The engine is rated 250 hp at 1800 rpm.

ZAPATA Offshore Drilling Co., whose mobile drilling rig is nearing completion by LeTourneau Co. at Vicksburg, Miss., has purchased two Model NKDDS Waukesha diesel engines to drive two 200-kw Electric Machinery generating sets on the offshore giant. Engines, sold by Reagan Equipment Co., are rated 390 hp at 1200 rpm.

LLOYD M. deFELICE, Sr., New Orleans, has purchased two Model 190 DLC Waukesha diesel engines to power two 20-kw generating sets aboard his tug *Lloyd M. deFelice Jr.*


NOW...

**PROOF . . .** Dramatic contrast between the cleaned and uncleaned portion of the above piston shows how thoroughly carbon is removed by Vapor Blast Liquid Honing — at ONE FIFTH of present costs.

**CLEAN DIESEL PISTONS *AUTOMATICALLY*— AT SAVINGS UP TO 80% WITH VAPOR BLAST***

**Liquid Honing* PROCESS**

**Labor reduced from 5 men to 1 . . . Cost per piston cut from $1.24 to 25¢** . . . That's the record reported by one well-known railroad overhaul shop after switching from hand methods to automatic VAPOR BLAST LIQUID HONING for diesel locomotive piston cleaning!

Today, instead of 5 men with hand scrapers, emery cloth and wire brushes, the job is done by *1 man* — in a specially designed semi-automatic Vapor Blast Liquid Honing machine. Pistons are cleaned more thoroughly, more uniformly, and precision tolerances in ring grooves are easily maintained — at *only 20% of former costs.*

*Write . . . for your copy of VB Application "Brief" No. 4 on "Diesel Engine Overhaul"*

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**Piston-Cleaning Time-Saver**

Here's the VB (model D129-49) Semi-Automatic Liquid Honing machine that cuts piston cleaning costs to the bone! Three fixed abrasive guns move up and down automatically over the face of the piston as it rotates. One gun cleans the inside, and another gun is used for "high-spotting" and cleaning the piston crown. Machine is completely self-contained, requiring only air, water, power and exhaust connections. One man does the whole job.

## Mid-Continent Diesel News

*By* Jack F. Cozier

ENGINEERING, FABRICATION and service of a complete new line of gas booster compressors for petroleum industry usage has been announced by the Tulsa department of the Le Roi Division of Westinghouse Air Brake Company. The complete package unit consists of a gas gathering compressor powered through a clutch and V-belt drive by a Le Roi engine of up to 655 hp according to compressor size and required pressures.

PARK HILL TRUCK Co., Tulsa, Okla., purchased a Unit 1014 crane powered by a GM 3-71 diesel engine from Midwestern Engine & Equipment Co., Tulsa, Okla.

CLARK BROTHERS Co., Olean, N.Y., one of the Dresser Industries, has appointed Charles J. Michelson as district manager of the Clark Tulsa office. Michelson replaces William Barnes, former Tulsa district manager, who is joining C. Lee Cook Co. in executive capacity.

MOORMAN CONSTRUCTION CO., Muskogee, Okla., bought a TD-24 IH torque converter drive tractor for work on the northeast turnpike with the sale being made by the Clarence L. Boyd Co., Tulsa, Okla.

SIGNAL DRILLING CO., Tulsa, Okla., purchased through the Mid-Continent Supply Co., a 30-A Unit rig with two Buda 8MO-1290 torque converters powering the draw works and two Buda 8MO-1290 natural gas engines to power the mud pump. The engines were sold by the Buda Engine & Equipment Co., Tulsa, Okla.

HUNTER READY-MIX Co., Inc., Hays, Kan., has bought a GM 6028C diesel for an eight inch sand pump from Salina Tractor Co., Salina, Kan., dealer under Diesel Equipment Co., Inc., Wichita.

STOWELL CORP., Tulsa, Okla., purchased a 4-71 GM diesel for repowering a drag line from the Diesel Power Co., Tulsa, Okla.

WILLIAM BROTHERS, Tulsa, Okla., just purchased a 390 Cleveland trencher for overseas work powered by a Cat D339 diesel engine from the Leland Equipment Co., Tulsa, Okla.

CONTINENTAL SUPPLY CO., New York, N.Y., has purchased a model 2GD-21C ac generator set from Stewart & Stevenson Services, Dallas, Tex., for auxiliary power on an oil field drilling rig.

UNITED GEOPHYSICAL CO., Tulsa, Okla., bought a Cat D7 tractor for oil exploration from the McCormick Machinery Co., Tulsa, Okla.

M & S DRILLING CO., Chelsea, Okla., purchased a 600 cu. ft. Joy compressor powered by an IH UD-1091 diesel engine for a drilling rig. The sale was made by the Butler-Sparks Equipment Co., Tulsa, Okla.

COLORADO INTERSTATE GAS CO., Denver, Colo., has bought a Unit 614 with a back hoe and crane powered by a GM 2-71 diesel from Midwestern Engine & Equipment Co., Tulsa, Okla.

GASO PUMP & BURNER MFG. CO., Tulsa, Okla., bought three Buda 8PC-2505 natural gas engines to power a figure 2652 Gaso pump for delivery to a major pipe line company in West Texas with the engines delivered to Gaso by Buda Engine & Equipment Co., Tulsa.

PUBLIC SERVICE CO., Tulsa, Okla., purchased an IH diesel model UD-1091 for powering a sand pump from the Clarence L. Boyd Co., Tulsa, Okla.

NATIONAL SUPPLY CO., Kevin, Montana, purchased a GM 12107 diesel from the Diesel Equipment Co., Inc.

A. W. McBRIDE, contractor, Fort Smith, Ark., bought three Cat DW15 tractor scraper units and one Cat #12 motor grader for general road construction from McCormick Machinery Co., Tulsa.

FALCON SEABOARD DRILLING Co., Tulsa, Okla., has bought a 10-13 Bethlehem rig powered by three Le Roi L3460 engines to be placed in service in Southern Oklahoma.

RAY BROCE, Woodward, Okla., purchased a Cedar Rapids Commander crushing plant powered by a 6-31 GM diesel sold by Leland Equipment Co., Tulsa, Okla.

W. H. FULTON, Oklahoma City, Okla., bought a TD-24 IH torque converter tractor for use on the northeast turnpike. The sale was made by the Clarence L. Boyd Co., Tulsa, Okla.

GEORGE E. FAILING CO., Enid,


TRUCK MECHANICS · OWNERS

Set Valve Clearance *Exactly Right!* Every Time with

P&G Valve-Gapper

New Technique 100% Accurate

Now you can set valve clearance on most OHV gasoline and diesel truck engines uniformly and with micrometer accuracy instead of depending upon individual "feel".

Check these VALVE-GAPPER advantages:

- Reduces Valve Adjustment time as much as 50%.
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- Serviceman can "SEE" Clearance on Dial Indicator BEFORE, DURING and AFTER adjustment.
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Models Available to fit these Truck Engines:
GM DIESEL • GMC GASOLINE
CUMMINS DIESEL
INTERNATIONAL HARVESTER
FORD • CHEVROLET
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Service man always has both hands free to use adjusting tools —he can "see" exact clearance before, during and after adjustment.

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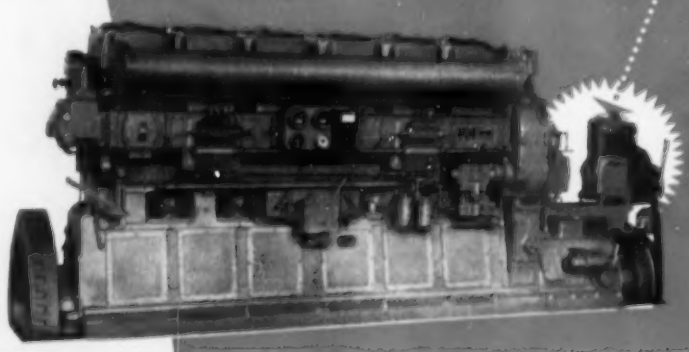
COOPER-BESSEMER CHOOSES Quincy COMPRESSORS FOR STARTING AIR



Quincy Compressors are standard equipment on Type JS-6 Cooper-Bessemer Diesel Engines. Cooper-Bessemer — like other leading engine manufacturers — have found that Quincy Compressors give them the long dependable service they require.

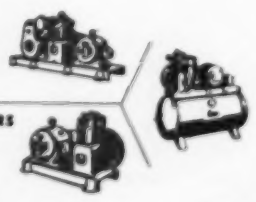
Rely on the experience and judgment of these engine makers, specify a Quincy Compressor for your next diesel starting job.

There's a model for every application. Sizes run from 1 to 90 c.f.m.

Write Dept. K-46 for our recommendations on the proper unit for your job.

QUINCY COMPRESSOR CO.
QUINCY, ILLINOIS

MAKERS OF THE WORLD'S FINEST AIR COMPRESSORS



Okla., purchased three HD-326 natural gas engines to power a 500-S Failing rotary rig from the Buda Engine & Equipment Co., Tulsa, Okla.

BENNETT STONE & GRAVEL, Ada, Okla., bought a Unit 1014 crane powered with a GM 3-71 diesel from Midwestern Engine & Equipment Co., Oklahoma City, Okla.

H. D. YOUNGMAN CONSTRUCTION Co., Baxter Springs, Kan., has bought four Cat #12 motor graders. This asphalt servicing contractor purchased the units from McCormick Machinery Co., Tulsa, Okla.

STICKLE DRILLING CO., Wichita, Kan., purchased two GM 12103 HD diesels from the Diesel Equipment Co., Wichita, Kan.

AMIS CONSTRUCTION CO., Oklahoma City, Okla., has in operation 23 Cummins diesels on a nation-wide scale including 10 NHBI-600 models used in Euclid, Allis-Chalmers and LeTourneau-Westinghouse equipment; two NHBI-600s in Heiliners, and 11 HBI-600s in Adams and LeTourneau equipment.

HUNTER CONSTRUCTION CO., Ada, Okla., bought one Cat D8 tractor for general road work from McCormick Machinery Co., Tulsa, Okla.

COSMO CONSTRUCTION CO., Tulsa, Okla., purchased two TD-24 and two TD-18 International crawler tractors. The sale was made by the Clarence L. Boyd Co., Tulsa, Okla., and the units will be used for road construction.

McMICHAEL CONSTRUCTION CO., Tulsa, Okla., has bought a 2-10 Chicago Pneumatic compressor powered by a GM diesel from the Leland Equipment Co., Tulsa, Okla.

MIDSTATES OIL CORP. has in operation near Homer, La., three unitized pump assemblies powered by three Buda 8MO-1290 power units, equipped with special water pump for heat exchanger cooling and an Ajax TPB-M-5250 aluminum-bronze Triplex pump.

H. C. PRICE PIPE LINE CO., Bartlesville, Okla., purchased two Cat D7 tractors from McCormick Machinery Co., Tulsa, Okla., with the units going into use for pipe line construction work.

INDIAN DRILLING CO., Tulsa, Okla., purchased an Ideco rig from Jones & Laughlin Supply Div. with the unit being powered by a GM 12103 diesel from the Diesel Power Co., Tulsa, Okla.

PUBLIC SERVICE CO., Tulsa, Okla., bought an IH diesel model UD-1091 from the Clarence L. Boyd Co., Tulsa, Okla. The engine will power a sand-pump.

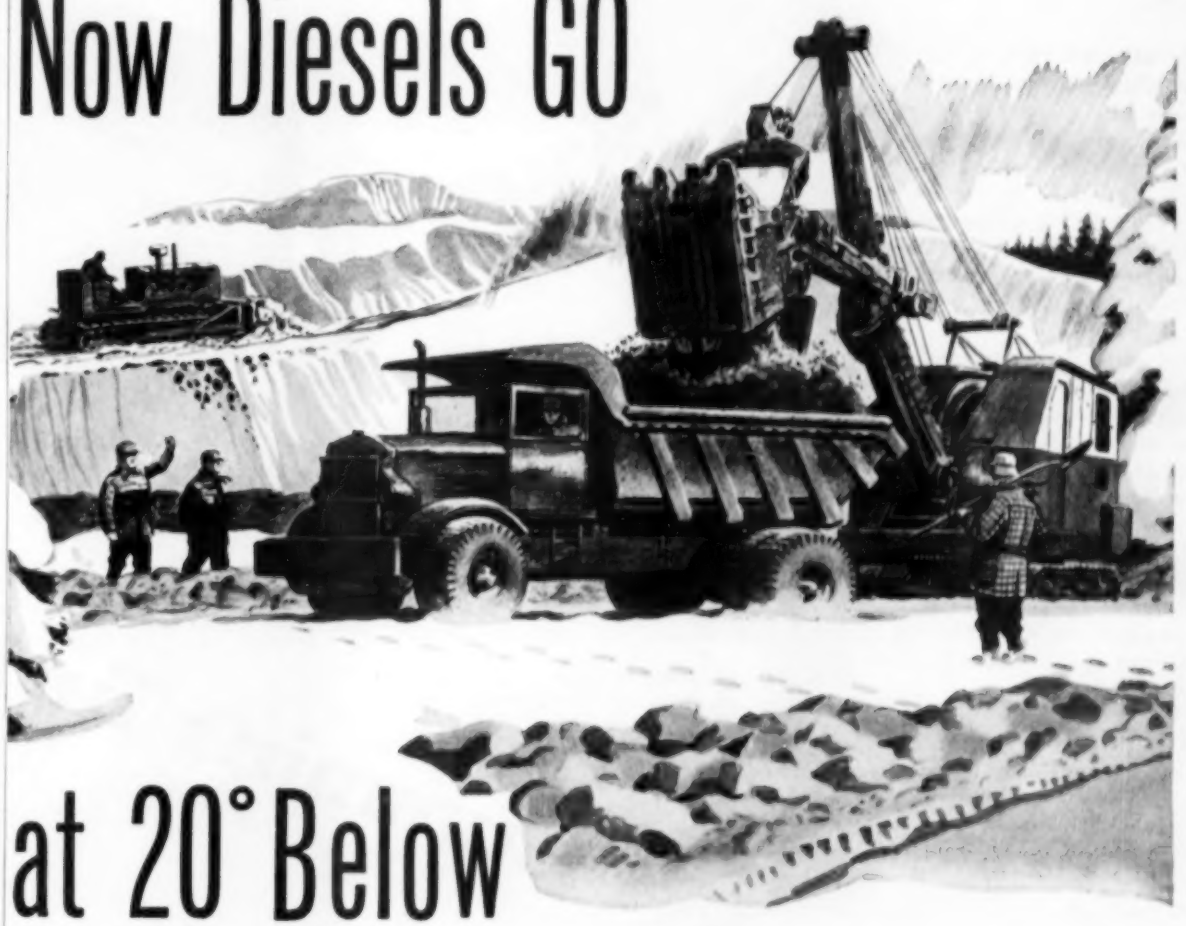
WILLIAMS BROTHERS PIPE LINE CO., Tulsa, Okla., has bought two Cat D8 tractors for pipe line construction work with the sale being made by McCormick Machinery Co., Tulsa, Okla.

RENFRO DRILLING CO., Wichita, Kan., purchased a National T-32 rig sold by the National Supply Co. National Supply purchased two GM 12103 HD diesels to be installed on the rig from Diesel Equipment Co., Inc., Wichita.

GEORGE PEASE, Fairfax, Okla., bought an IH dozer model TD-14 from the Clarence L. Boyd Co., Tulsa, Okla.

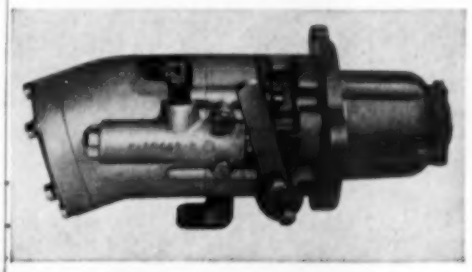
**IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Be sure of your copy of this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.**


# Now Diesels GO



# at 20° Below

*New Hydrostarter Spins Engines Faster*



Heart of the Aeroproducts Hydrostarter is this hydraulic starting motor which spins a Diesel twice as fast as battery-operated starters.

Now, before winter sets in with a vengeance, is the time to put a new, low-cost Aeroproducts Hydrostarter on your Diesel.

Even at 20° below zero, this hydraulic starting system gives you quick, sure starts on every Diesel up to 300 horsepower no matter how long your equipment has been standing idle. The motor delivers maximum torque at all temperatures to overcome starting inertia.

It replaces conventional starting systems, frees you from many maintenance problems and costs less to operate.

And it sells for a far lower price than any other nonelectric Diesel starter available today.

Your Diesel engine or equipment dealer can install an Aeroproducts Hydrostarter on your Diesel in just a few hours' time. He can give you full information—or quickly get it for you. See him today or write direct for full details.

*General Motors engineering leads the way*

*Building for today...Designing for tomorrow*

*Aeroproducts*

ALLISON DIVISION OF GENERAL MOTORS, DAYTON, OHIO

## Mid-West Diesel Notes

*By* **L. H. Houck**

EAGLE-PICHER CO., Miami, Okla., has more than 50 GM diesel units operating on more than 85 miles of underground roads. They include ore cars, power shovels, drills and personnel cars. First diesel with an exhaust scrubber for underground use was put into service in 1947.

WICHITA BRANCH of Victor L. Phillips, Kansas City, has delivered a 660 Adams motor grader to Ritchie Bros., Wichita, equipped with a 140-hp HBI-600 Cummins.

LILY TULIP Cup Co., Springfield, Mo. has purchased a Model 9000 White truck powered with a JT-6 Cummins from the Missouri White Co.

W. A. McKNIGHT has been appointed St. Louis sales office manager for Baldwin-Lima-Hamilton Corp., coming from the company's Houston office and succeeding E. H. Schoonmaker, named eastern sales manager.

RITCHIE Bros., excavating contractors in Wichita, have taken delivery of a Model D LeTourneau-Westinghouse Tournapull with a 4-71 GM, 138 hp at 2000 rpm. Sale was made by Victor L. Phillips, Inc.

CITY OF CAROLLTON, Mo., has completed construction of an addition to its municipal power plant to house a radial Nordberg diesel which will be added to its power plant consisting of two Busch-Sulzers and three Worthington diesels. Ray Anderson is manager of Carollton utilities.

MISSOURI WHITE CO., Springfield, has delivered four of a 45 order of Model 9000 White diesels with JT-6 Cummins engines to Roadway Express Co.

JACK BOYER, Augusta, Kan., has taken delivery on a White tractor with a Cummins 180-hp diesel for gasoline transport with the Lyndon Transport Co. Sale by Wichita White Truck Sales.

CONTINENTAL CENTRAL Lines, with buses operating throughout the Mid-West, has repowered a unit with a NHHB-600 Cummins, 200 hp, from Cummins Sales & Service, Wichita.

L. W. REXROAD, Salina, Kan., has taken delivery on three Model C Tournapulls from Victor L. Phillips, Inc., Wichita, with 6-71, 208 hp GM diesels.

WICHITA WHITE Truck Sales, Inc., has sold an Autocar tractor powered with a 180-hp Cummins to A. . Pickett, of Brownfield, Texas.

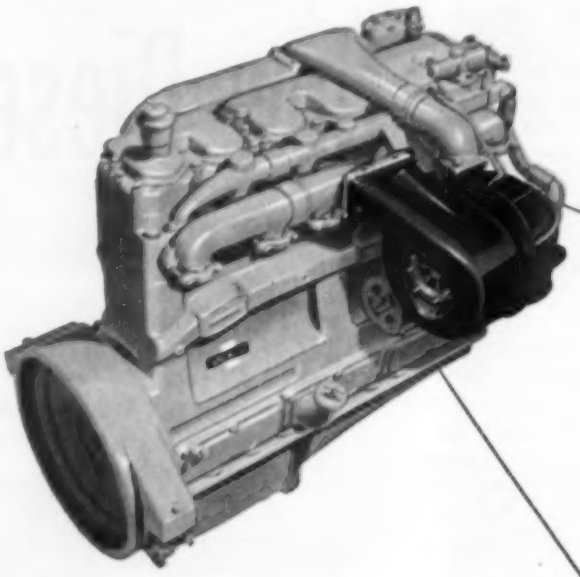
NORTON COUNTY, Kansas, has bought a Model D Tournapull with a 4-71 GM diesel from Victor L. Phillips, Inc., Wichita branch.

LEWIS DRILLING CO., Wichita, has taken delivery on two NHBI-600 Cummins diesels for dual compound unit on drill rig. From Cummins Sales & Service.

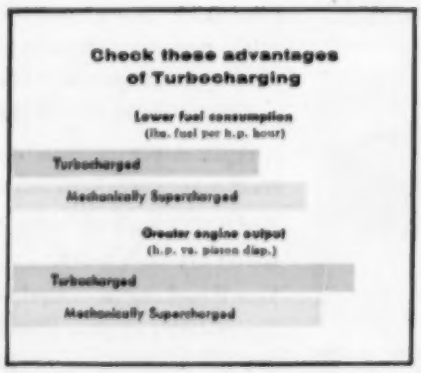
EDWARD VANERT, Superior, Wisc., bought a Model JBS-600 Cummins, to repower a truck used in general highway hauling, from Cummins Diesel Sales Corp., Hibbings, Minn.

G. & H. TRUCK Lines, Wichita, have added an Autocar with a Cummins 180 hp and a White with a similar diesel to their truck fleet.

SHERWOOD CONSTRUCTION CO., Wichita, have added two Model B Tourapulls with NNRBIS-600 Cummins 300-hp engines and three Model C Tournapulls with 6-71 GM diesels, to their construction fleet.

Cummins Turbodiesels . . .

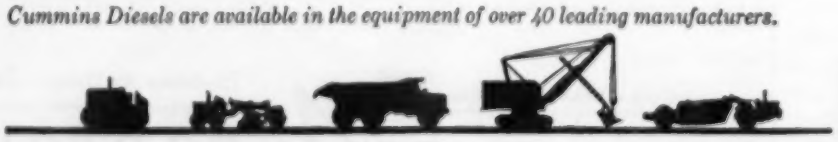



Five new Cummins Turbodiesels (175 . . . 250 . . . 262 . . . 300 . . . and 600 h.p.) now feature the sensational new development—exhaust gas turbocharging of high-speed diesels.

They give you more economy . . . better performance than naturally aspirated or mechanically supercharged engines. Exhaust gas energy normally wasted is harnessed to achieve a more perfect air-fuel mixture in the combustion chamber, without any parasitic load. (See diagram at right.)

If you want reduced fuel costs . . . longer engine life . . . lowest possible weight per horsepower . . . and maximum profits . . . get full details on Cummins Turbodiesels from your nearest Cummins Distributor.

*Cummins Diesels are available in the equipment of over 40 leading manufacturers.*



CUMMINS

Cummins Engine Company, Inc. • Columbus, Indiana

## Inland River Reports

*By* A. D. Burroughs

A PAIR of Nordberg engines, each developing 800 hp at 275 rpm, will power the new boat yet unnamed which is under construction at the Calumet Shipyard and Dry Dock Co. for the Material Service Corp. (Chicago), reports Marine Division Manager Arnold Sobel. Modern, spacious, with retractable pilothouse for use on the Illinois River, this boat will be a sister boat to the firm's *Irving Crown* but with more size and power. Kort Nozzles are included.

ANOTHER NEW ONE ready for Illinois River duty by early spring for the Bull Towing Co., Joliet, Ill., is now under construction at Nashville Bridge Co. Similar to the *Bull Durham*, this triple-screw vessel will get its power from Fairbanks-Morse engines with pumps powered by GM (Detroit) 671 diesel engines.

HERCULES engines developing 330 hp will power the new towboat currently under construction at Dubuque Boat and Boiler Co. for the Allgire Rudderless Tugboat Service at St. Louis. This will mark the 26th addition to the Allgire fleet.

*JOHN J. ROWE*, the brand-new addition to the Ohio River fleet is now in action powered by three Baldwin-Lima-Hamilton engines, developing 3150 hp. Falk reverse and reduction gears, Airflex clutches, two Caterpillar generator sets, and Quincy air compressors are also included.

THE *Franklin D. Roosevelt*, built in 1933 by Midland Barge Co. and owned by Federal Barge Lines, has been taken over on a rental-purchase basis by the S. and S. Towing Co., Joliet, Ill. Reported to be re-named *Crystal Falls*, this vessel equipped with McIntosh & Seymour engines for a total 1180 hp, made inland river history delivering the first Federal tow to Kansas City in 1935.

THE POWERFUL 15-year-old *Jefferson*, ABL boat, was giving fine performance upbound on the Ohio with a tow of nine barges. It is equipped with Cooper-Bessemer L-S 8 engines for a total of 2000 hp at 300 rpm.

THE *Jeffboat*, another powerful ABL boat, powered by Fairbanks-Morse OP 10-cylinder, 8½x10 diesels giving a total 3000 hp was upbound with a tow of 15 barges. Long popular for her power and performance, this one was built by Jefferson Boat Yard in 1953, equipped with Kort Nozzles.

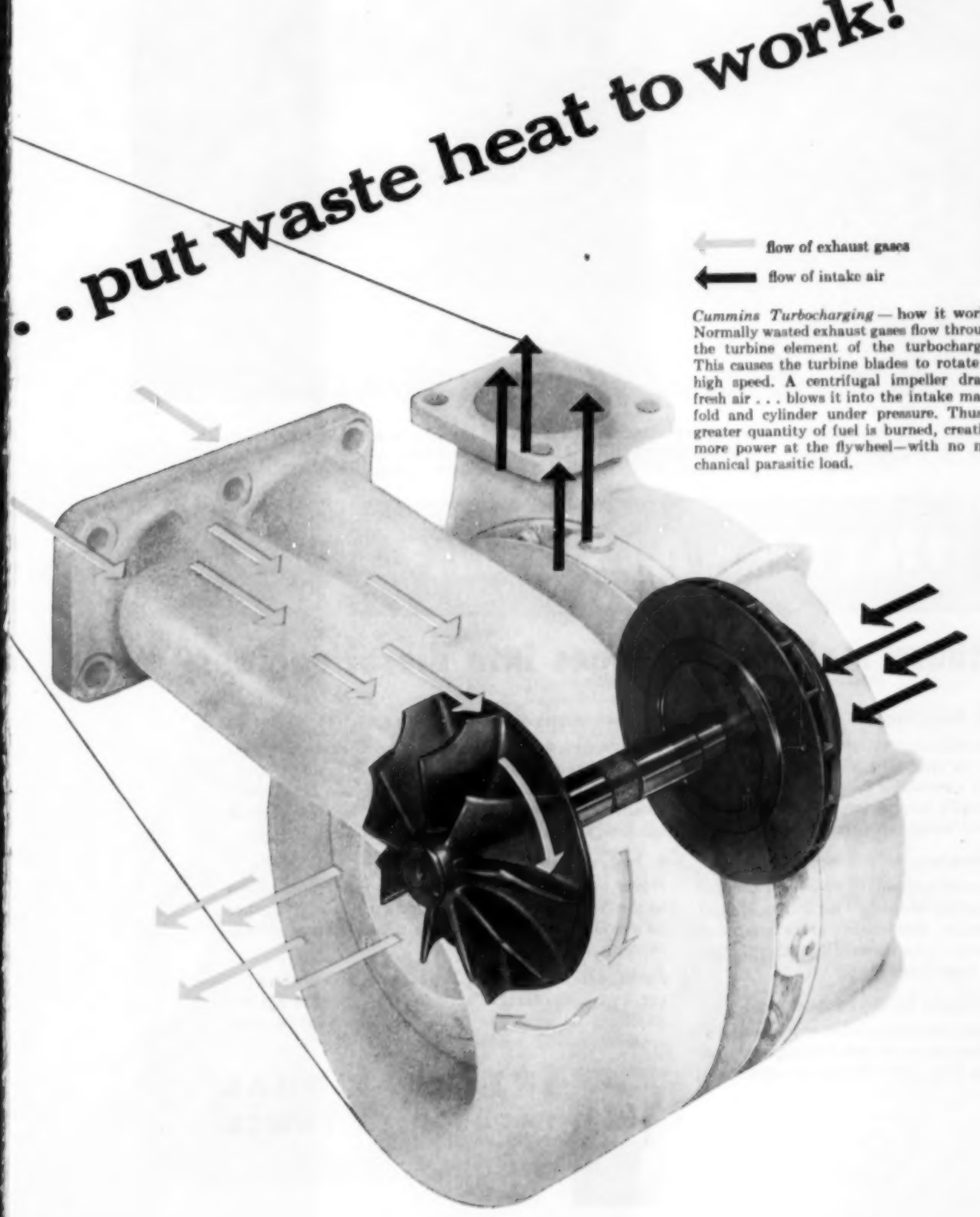
THE Zubik fleet's *Benwood*, formerly active in the coal trade is now using its Buda engines installed in 1951 for work in the gasoline trade.

THE *Charles Zubik*, with 1800 hp developed from GM engines installed in 1950 replaced the *Benwood* in the coal trade. Active since 1938, this one formerly carried the name *Mobile*. A new name and new power came when purchased by the Zubik Towing Co., Pittsburgh.

ANOTHER OLDTIMER with new life and new power is the *Cap'n Harrison* now busy in the Cheat River coal trade. Built in 1934, it was originally the *Col. Nelson Morris*. Caterpillar Model 364 diesel engines were installed in 1950 by the present owners, Coal City Towing Co., Pittsburgh.

THE NEAT little *Tom Thumb*, owned by Aiple Towing Co., Stillwater, Minn., and powered by Cummins diesel rated at 250 at 900 rpm was caught by our camera. This unique little boat has removable hull sections on the sides to reduce width for overland transportation.


. . . put waste heat to work!



flow of exhaust gases

flow of intake air

*Cummins Turbocharging* — how it works. Normally wasted exhaust gases flow through the turbine element of the turbocharger. This causes the turbine blades to rotate at high speed. A centrifugal impeller draws fresh air . . . blows it into the intake manifold and cylinder under pressure. Thus a greater quantity of fuel is burned, creating more power at the flywheel—with no mechanical parasitic load.

Widely used as original power, International diesels are available in a wide variety of sizes and modifications. Two IH diesels are used here . . . 115 hp unit in ¼-yd dragline, 190 hp unit in 200-ton-per-hour crusher.

# only INTERNATIONAL builds all these major advantages into diesel engines

**1. Full-flow lube oil filters lengthen engine life**

New replaceable plastic impregnated full-flow filters increase engine life by removing all harmful particles from the oil before it goes under full pressure to engine bearings. Exceptionally large filter area extends filter change period to 500 hours under normal conditions.

**2. New injection pump reduces maintenance**

Time proven International single and twin plunger pumps have been further simplified for longer life and lower cost maintenance. Scavenging gears and pump air pipe are eliminated . . . hardness of injection plunger increased for up to four times longer life.

**3. Drilled passages assure full-time lubrication**

You can be sure *all* engine bearings will be lubricated at *all* times. Lube oil is pressure-pumped through internal rifle-drilled passages that can't rupture or work loose.

**4. Clean combustion on low-cost fuel**

Trouble-free single orifice injection nozzles, and pre-combustion chambers mounted at 45° angle thoroughly mix fuel and air under all load and speed conditions. You get follow-through power strokes, clear exhaust, smooth idling on low-cost No. 2 fuel.

**5. Fast, sure starting . . . always**

Never mind cold—IH diesels work year 'round, even in the Arctic. Seconds-fast, they start in any weather on gasoline . . . and, seconds-fast, you switch to clean-burning, full-diesel power.

Six sizes of diesels, 52 to 190 hp, complete with radiator and fan. Also 12 models, 16½ to 200 hp, for gasoline, natural gas or LPG. See your nearest International Distributor for details.

**INTERNATIONAL**
**INDUSTRIAL POWER**

# "Trane is giving us the exact performance we specified!"

*Trane Fluid Cooler engineers know actual field performance because Trane makes its own coils . . . and has been making them for 30 years.*

**That's why TRANE can say "Yes!"** to your design requirements—*and deliver!*

TRANE has *field experience* covering virtually *all* types of coils and fans under *all* types of operating conditions—plus a tremendous backlog of supporting engineering design and laboratory test data.

That's why TRANE can more accurately tell horsepower consumption beforehand. And guarantee complete unit quality. TRANE *controls the coil's quality!*

Want the *complete* story on TRANE Fluid Coolers? Call your TRANE Sales Office or write TRANE, La Crosse, Wis.

**FACTORY ALIGNMENT** *of motor and gear box simplifies field installation, minimizes vibration—assures longer life! Complete drive unit shipped assembled.*

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## Gulf Coast Diesel Notes

*By* Michael T. Pate

CLARK FUEL Producing Co., McAllen, Texas, will use two General Motors series 71, model 12103, twin-6 diesels to power a drilling rig. The engines, rated 260 hp each at 1600 rpm, were delivered by Stewart & Stevenson Services, Inc., of Houston.

BAROID DIVISION, National Lead Co., Houston, has had unitized by Houston Armature Works and installed by Port Houston Iron Works, both of Houston, two Buda diesels, model DCS2505, each driving 250-kw alternators. The engines will provide propulsion power for a self-propelled barge under construction. The diesels were bought from Buda Engine & Equipment Co., Inc., of Houston, Texas.

JANES Sand & Gravel Co., Austin, Texas, bought two Stewart & Stevenson 275-kw ac generator sets, each powered by a General Motors series 110, model 122403 twin-6 diesel. The units will be used in the company's gravel pits in the Panhandle area of Texas.

ALASKA Consolidating & Forwarding Co., Seattle, Wash., bought, through Gable Electric Service Co., Galena, Texas, two 8-cylinder model 81AD8½ Fairbanks-Morse diesel engines, each rated at 580 hp.

ANDERSON'S Fishing Camp, Bolivar, Texas, will power its 28-ft. wooden shrimp boat with an 80-hp General Motors series 51, model 42300 diesel, driving through a 2:1 hydraulic reversing and reduction gear. The unit was sold and installed by Stewart & Stevenson Services, Inc.

PARKER BROS. & Co., Inc., Houston, bought, through Mustang Tractor & Equipment Co., two model D397 Caterpillar marine diesels, rated at 450 hp, continuous, which will be used to power a 75-ft. tugboat being built by the firm.

CERTAINTEED Products Co., Vernon, Texas, will repower a Plymouth yard locomotive with a 130-hp series 71 torque-converter equipped 6-cylinder General Motors diesel, furnished by Stewart & Stevenson.

INGALLS Shipbuilding Corporation, Pascagoula, Miss., is installing two 6-cylinder Hercules diesels, models LIX-6ECS and DIX6ES, in a pleasure craft under construction by the firm. The diesels were furnished by Hercules Motors Corp., of Houston.

J. C. WYNNE, Tyler, Texas, has bought a Stewart & Stevenson vertical (dry sump) General Motors series 71 diesel. The 80-hp, 4-cylinder engine will be mounted over a deep well turbine pump, and will be used for irrigation on the purchaser's land near Havana, Cuba.

INDUSTRIAL AIR CONTROLS, Fort Worth, Texas, has bought from Waukesha Sales & Service, Inc., Houston, a model 180DLCU 20-hp Waukesha diesel which will be used to power an air compressor.

ESSAR RANCH, San Antonio, Texas, bought its second and third 65-hp Stewart & Stevenson vertical model series 71, 3-cylinder General Motors diesels for turbine pump drive in irrigation service.

TEXAS BUS LINES, Houston, has secured from Cummins Sales & Services, Inc., of Houston, four Model JT6B Cummins diesels rated at 175 hp which will be used for repowering the company's intercity buses.

CRAIG Machinery Company, Danvers, Mass., has bought from Stewart & Stevenson Services, Inc., thirty model MB-2


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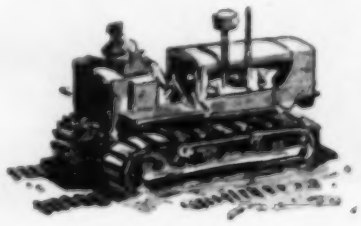
Heart of the system is a hydraulic starting motor operated by oil under high pressure. An engine-driven pump builds up and maintains pressure in a piston-type accumulator.

To start a General Motors Diesel equipped with a Hydrostarter, the operator opens a simple control lever to admit this oil to the motor which spins the engine. The control lever also completely engages the starting motor's gears with the flywheel before operation.

Your mechanics will get good use from the hand-operated pump which can be used to rotate the engine's flywheel slowly for timing adjustments. This pump can also be used to raise pressure if needed. The oil supply is stored and filtered in a reservoir.

Right now—before winter sets in with a vengeance—is the time to see your GM Diesel distributor about the new Hydrostarter. He can quickly install this new starting system on your Detroit Diesel engines—or can give you full information on the new Hydrostarter.



25-kw generating sets, each driven by a General Motors series 71 2-cylinder diesel. The units were winterized to permit operation at temperatures as low as minus 65°F, and provision made for operation up to 130°F ambient.

FARNSWORTH & Chambers Co., Inc., Houston, contractors for the Lake Charles, La., Air Force Base, have secured from Buda Engine & Equipment Company, Inc., Houston, three 150-kw, 720-rpm generating sets, each driven by a Buda diesel, to serve as power source.

THE AUSTIN Co., Dallas, has bought for auxiliary power a Stewart & Stevenson model 12GD-175 ac generator set, powered by a General Motors twin-6, series 71, model 12103 diesel.

CLEGG & HUNT, Houston drilling contractor, bought from Houston Engine & Pump Co., a 6-cylinder model 124 Murphy diesel, rated 225 hp at 1200 rpm, which will be used to drive a mud pump.

CATE Equipment Co., Salt Lake City, secured its third Stewart & Stevenson model 12GD-175, 175-kw ac generating unit for its uranium mine near Austin, Nevada. The unit is powered by a General Motors twin-6 series 71, model 12103 diesel. The company also bought a Stewart & Stevenson model 6GD-65 ac generating set driven by a series 71, model 6030-C 6-cylinder General Motors diesel.

HOUSTON Oil Field Material Co., Houston, has secured from Waukesha Sales & Service, Inc., of Houston, a model 135DKU Waukesha diesel to power a mud-conditioning pump.

JOHN G. HOLLAND Construction Co., Houston, bought from Stewart & Stevenson, a series 110, model 62405, 6-cylinder General Motors diesel, torque-converter equipped, to repower a Buckeye ditching machine.

A. VAN ZYVERDEN has had his agents, Industrial Plant Engineers, of Houston, purchase from Buda Engine & Equipment Company, Inc., two 10-kw diesel generator sets, each powered by a Buda diesel, for powering coffee dryers in his El Salvador and Guatemala operations.

SUPERIOR OIL CO., Lake Arthur, La., has secured from Stewart & Stevenson a 4-cylinder series 71 model 4051-C General Motors diesel equipped with a Cotta speed reducer. The unit will be used for a pump drive.

SEA EXPLORATION & Salvage Co., Houston, has bought from Buda Engine & Equipment an Onan model 3MDSP, 3-kw, marine diesel generating set which will be used for lighting one of their smaller vessels.

C. G. GLASSCOCK Drilling Co., Corpus Christi, bought three General Motors quad-6, series 71, model 24103 diesels rated at 520 hp each at 1600 rpm. They will power a drilling rig. The company will provide auxiliary power with two Stewart & Stevenson model 6GD-65 ac generating sets, each driven by a series 71, 6-cylinder, model 6030-C General Motors diesel.

## Oil and Gas Power Division Meeting

The Oil and Gas Power Division of the American Society of Mechanical Engineers will hold its annual meeting April 3-6, 1956 at the Jung Hotel in New Orleans, La.

Exhibit space for this looked-forward-to annual event is limited and will be sold on a first-come first-served basis as in the past. R. A. Schakel, who is accepting reservations, urges all suppliers who intend to exhibit and who have not yet made the necessary arrangements, to do so immediately. Write him at the Diamond Chain Company, Inc., 407 Kentucky Ave., Indianapolis 7, Ind.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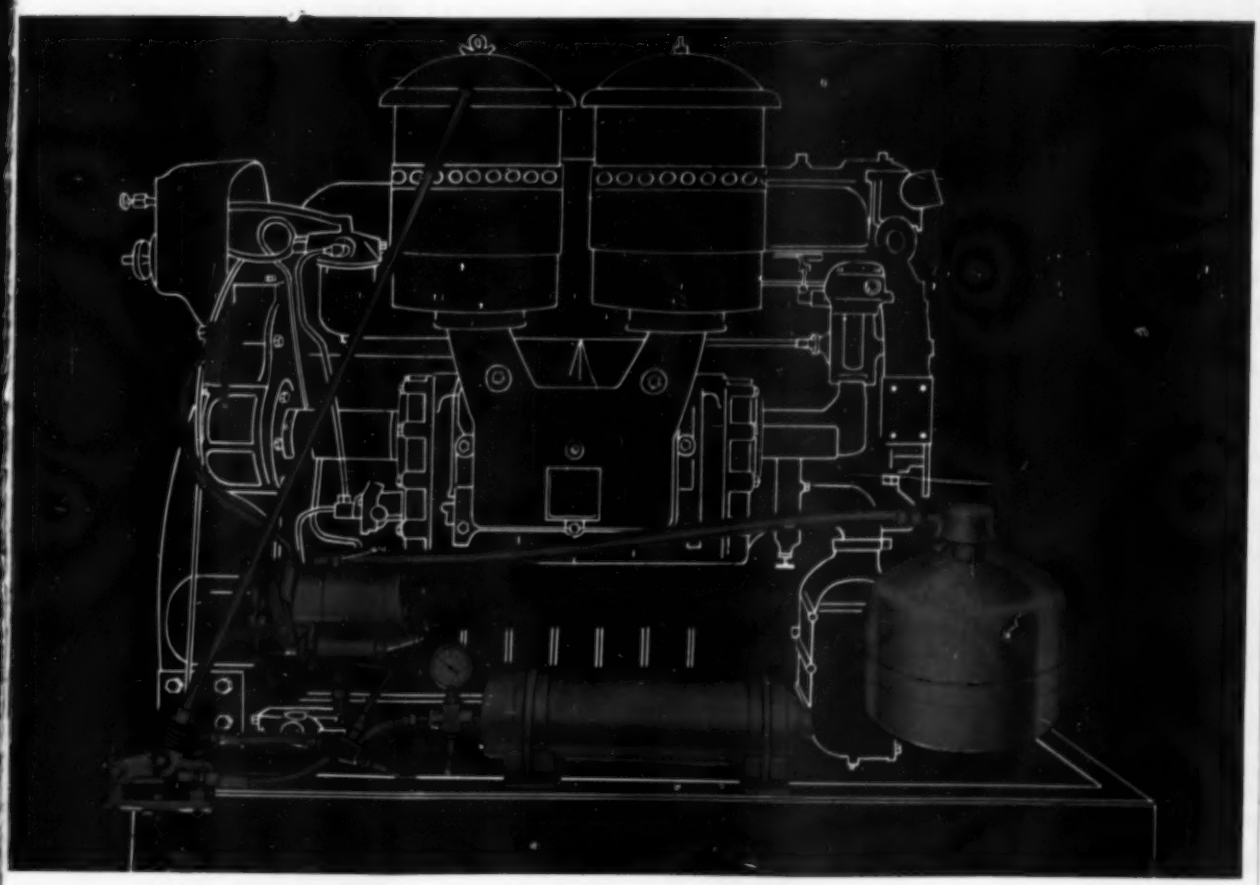

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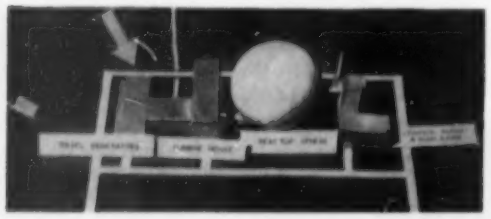
## European Diesel News

*By* Leo Walter

MAKERS AND USERS alike of diesel engines are interested in developments of nuclear power plants, and how the latter will affect the future of diesels as prime movers. Nobody can predict with certainty what the distant future may produce on designs of power plants. However, we can safely assume that the modern oil engine, especially the supercharged diesel, will hold its own for a long time to come. It is encouraging to note that diesels are a necessity for the new atomic power stations coming into being in the U.S.A. and in Great Britain. As an example, note the scale model illustration of Britain's No. 2 experimental power station. Using a breeding type nuclear reactor, it is being built at Dounray in Scotland. This station is to become the proving ground for future British industrial power developments. On the left of the photograph can be seen a plant section where considerable space has been allocated for diesel generators. This model was shown for the first time in 1955 at the Royal Institution in London and it also was shown at the Geneva conference.

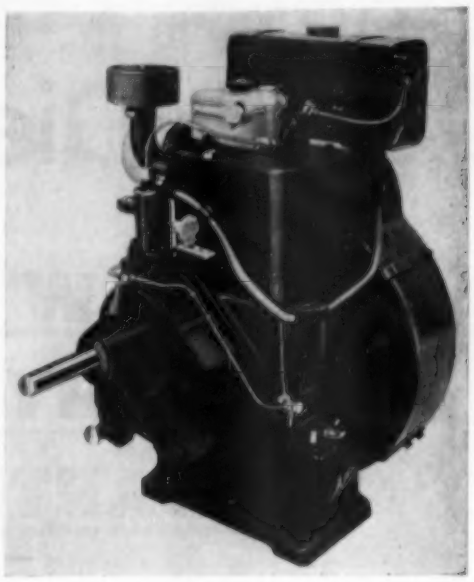


MESSRS. KOCKUMS Mekaniska Verkstadts, A.B., Malmo, Sweden, have built M.S. *Tiber* for the shipping firm of Wilh. Wilhelmsen of Oslo, Norway. It has a deadweight of 10,300 tons and 17.6 knots speed. A 10-cylinder, two-stroke single-acting M.A.N. engine transfers 9000 bhp to the screw.

THE PRESENT RANGE of M.A.N. diesels now manufactured by the North British Locomotive Co. Ltd., Glasgow, under license includes all of the WV series, types LV and VV.

JOHN COCKERILL S.A. of Seraing (Belgium) has supplied to the Cie. Maritime Belge S/A the first double-acting, two-stroke, supercharged diesel built in Belgium under license from Burmeister and Wain. The engine is of the exhaust piston type having six cylinders of 590 mm. diameter, 1700 mm. combined stroke. Under test, about 1360 bhp were obtained per cylinder, making a total of 8150 bhp. In this plant, it is claimed that two Brown Boveri VTR 630 exhaust gas turbo blowers deliver the air, drawn from the engine room, under the constant-pressure principle to the suction side of two Rootes type blowers. The exhaust belts from the top and bottom cylinders are connected through a large diameter pipe in order to equalize the load on the two turbo-blowers, and to damp down pressure fluctuations.

THE 1955 International Trade Fair at Plovdiv, Bulgaria, has shown a number of diesel engines from various countries, including the Petters PAZ-1 engine, exhibited at the stand of the Brush group. It is a cold-starting, air-cooled diesel, with 3 in. bore and stroke. It has a dry weight of 265 lbs. and delivers 1½ to 2½ bhp at speeds of 1000 and 1500 rpm. Also exhibiting were Mirrless, Bickerton & Day, Ltd. of Stockport. A model was shown of their 12-cylinder turbocharged V-form KV SS 12 type which develops 3060 bhp at 450 rpm. J. and H. McLaren, Ltd. of Leeds, showed their 55-kw diesel generating set.



MESSRS. WERKSPOOR N.V. of Amsterdam, Holland, are in the course of delivery of 90 locomotives to the Argentine National Railways. The engine used is the Werkspoor R U B 1612 type, a 12-cylin-

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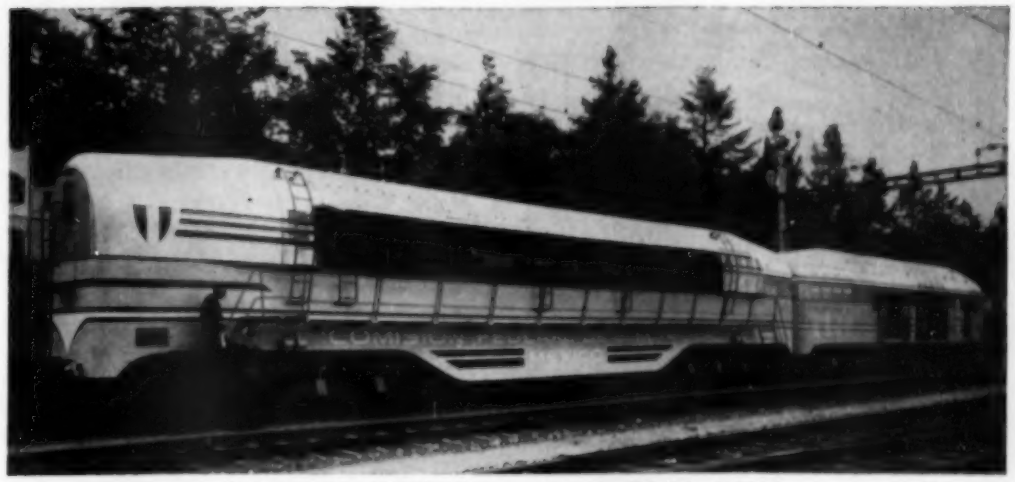
**OIL IS WHERE YOU FIND IT**—Unfortunately, not all wells can be drilled in the sticks. Some rigs must be operated near populated areas where complete silencing is imperative if complaints from residential neighbors are to be avoided. The Kittell Residential Silencer, Series ECS, used on the demonstration rig shown above was developed for just such locations. It reduces exhaust noise to an absolute minimum, permitting round-the-clock operation. Kittell Silencers are available in various standard sizes and types, including stainless steel or ceramic coated, in any quantities. Custom models engineered to meet specific requirements. Excellent delivery. Write to Kittell Muffler & Engineering, 915 South Santa Fe Avenue, Los Angeles 21, California, for catalog. *Experienced design and application engineers needed.*

der pressure-charged V-model running at 1400 rpm. Rating at sea level under European conditions is 650 bhp. A Buchi-type pressure charger made by Brown Boveri & Cie A.G. is embodied in the design. A Ricardo Comet Mark III spherical combustion chamber is fitted in the cylinder head. The fuel injection pumps are supplied by Bryce and by C.A.V., but Bosch types can be used.

THE ITALIAN ANSALDO Works of Genoa (Italy) have greatly increased their output of Ansaldo-Maybach engines for railcars and of Mekydro transmission gears manufactured under license from Maybach Motorenwerke A.G. of Friedrichshafen, Germany.

THE USE OF emergency power stations on wheels is increasing in many countries, partly in consequence of demands from civil defense authorities. A notable plant on two railcars has been designed by Brown Boveri & Cie A.G. of Switzerland in cooperation with Schweizerische Lokomotiv-und Maschinenfabrik (SLM) A.G. of Winterthur. A complete gas turbine driven power plant for transport was ordered by the Federal Electricity Commission of Mexico. Two units have been delivered after comprehensive tests. Each mobile power station produces 6200 kw and consists of a car carrying the complete power plant. In a second carriage, the transformer and switch gear are housed, with control panel, battery, and a small 190-hp SLM diesel engine, used for starting. Fuel oil usually will be supplied from a cistern railway car on the same or on an adjacent siding.



**The Brown Boveri designed power station on wheels for Mexico.**

IT IS REPORTED that Maschinenbau A.G., Germany has developed a 1600 bhp diesel-hydraulic locomotive, type 1600 BB. Power can be increased to 2000 hp if required. Two turbo-blowers supercharge the MAK diesels which provide a travelling speed of 85 mph. A three-speed, fully automatic transmission with flange-mounted reverse gear is used back of the engine.

ONE HUNDRED AND THIRTY diesel-electric locomotives have been supplied by SACM Société Alsacienne de Constructions Méchaniques of Mulhouse, Alsace, France to the Netherlands State Railways. These Alsthom locomotives use the MGO V 12 SHR engine rated at 925 hp, coupled with a direct current generator.

THE British Brush Group exhibited at the British Trade Fair at Copenhagen, Denmark from Sept. 29 to Oct. 16. Among other members of this group of diesel manufacturers is the National Gas and Oil Engine Co. Ltd., of Ashton-under-Lyne. They showed their 6-cylinder, 4-valve-head marine diesel.

THE NEW REPAIR plant for diesels of Nordisk Diesel A/S, a subsidiary of Burmeister and Wain at Copenhagen is said to be one of the most modern in European countries.

THE YUGOSLAV State Railways placed an order with the German Waggonwerke A.G. Uerdingen for 10 four-wheel diesel railbuses using Bussing diesel engines, and for 10 railbus trailers.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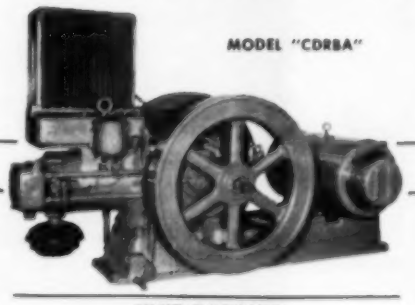

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| Model | Cooling | Continuous Rating | | Drive |
|---|---|---|---|---|
| | | KW | Engine rpm | |
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| "ADTDA" | Tank | 2.4 | 1200 | Direct |
| "BDRBA" | Condenser | 4.9 | 900 | V-Belt |
| "BDTBA" | Tank | 5 | 900 | V-Belt |
| "LDRBA" | Radiator | 5.4 | 1350 | V-Belt |
| "LDTBA" | Tank | 5.7 | 1350 | V-Belt |
| "CDRBA" | Condenser | 7.7 | 750 | V-Belt |
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Propulsion engine is a Model 45-M6-6 Atlas Imperial diesel engine rated 300 horsepower at 750 rpm, 2 to 1 reduction. Turning a propeller of 62-inch diameter and 42-inch pitch, the engine provides a cruising speed of 10 knots and a top speed of 11 knots. This engine replaced a 120 horsepower Atlas engine, used for many years. Despite the greater operating range of the new engine, the *Ivana* is reported to idle as well as with the older slow-speed diesel engine.

## Michigan Distributor

C. R. Boll, vice president—sales, Cummins Engine Company, Inc., Columbus, Indiana, has announced the formation of a new Cummins Distributor for Michigan and the seven counties surrounding Lucas County (Toledo) in Northern Ohio. Name of the new firm is Cummins Diesel Michigan, Inc., and its headquarters is at 3601 Gratiot Avenue, Detroit. Heading the new firm are: L. W. Childs (left), president, and J. S. L. Shales (right), vice president. Mr. Childs was formerly associated with the Cummins Distributor for Eastern Canada, Russel-Hipwell Engines, Ltd., at Owen Sound, in an executive capacity for 14 years.

## Manager of Engineering

H. J. Buttner

H. J. Buttner has been appointed manager of engineering for the Le Roi Division of Westinghouse Air Brake Company, Milwaukee, Wisc. The announcement was made by Paul I. Birchard, vice president and general manager of Le Roi, manufacturers of internal combustion engines, portable and stationary air compressors, Tractairs, and air tools. Mr. Buttner has had nearly 25 years of engineering experience in the design and development of high output internal combustion engines, including all phases of research, development and testing. He has also been responsible for creating a complete combustion research facility. He has held engineering management positions with the Continental Motors Corporation, the Allison Division of General Motors and the Packard Motor Car Company. He was on the Purdue University faculty from 1946-1952.


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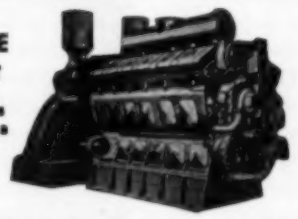

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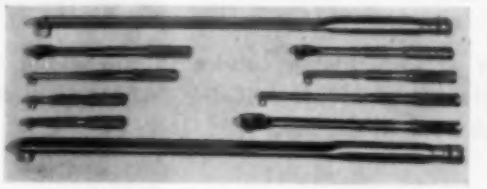
## Named Executive of Diesel Energy Corporation

H. K. Breustedt

H. K. Breustedt was named vice president in charge of engineering of the Diesel Energy Corporation, 82 Beaver Street, New York City, it was announced recently by Maximilian B. Bauer, vice president and chief executive officer. Mr. Breustedt, a civil engineer, has supervised various industrial projects in Turkey and the Middle East for German concerns. He is a leading engineer of Kloeckner-Humboldt-Deutz A.G., Cologne, Germany. That company has delegated him to the Diesel Energy Corporation as special advisor on the Deutz air-cooled diesels which are imported, distributed, sold and serviced by the Diesel Energy Corporation.

## Expands Torque Wrench Line



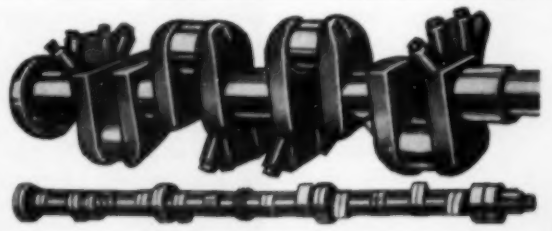
Ten super-precision Model F torque-limiting wrenches added by Proto.

Addition of ten Model F Proto torque-limiting wrenches has been announced by Nelson Bartoo, Research & Development Director of Plomb Tool Company. They are super-precision models, with a fixed head bearing pin, improved roller block, side adjusting seal, and handle and seal. In conformance with military specifications, they are calibrated to an accuracy of plus or minus 3%, plus a maximum of 2 lbs.

Like the twelve regular models introduced earlier, the ten new ones use a torque-limiting principle instead of dials, scales, or other indicating devices. When the desired torque set on the micrometer-type handle is reached, the wrench releases automatically, signals the user with a reflex action, and resets itself.

The new line includes models with ¼ in., ⅜ in., ½ in., and ¾ in. drives, with plain and ratchet heads, and with capacities from 5 to 4800 inch-pounds and 100 to 500 foot-pounds.

For further information on the new Proto torque-limiting wrenches, write to Plomb Tool Co., 2209 S. Santa Fe, Los Angeles, Calif. (ITS NEW)

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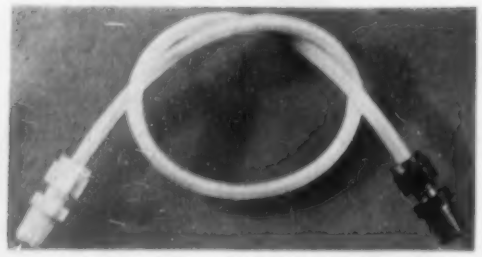
STRATOFLEX OF CANADA, INC. TORONTO 18, ONTARIO

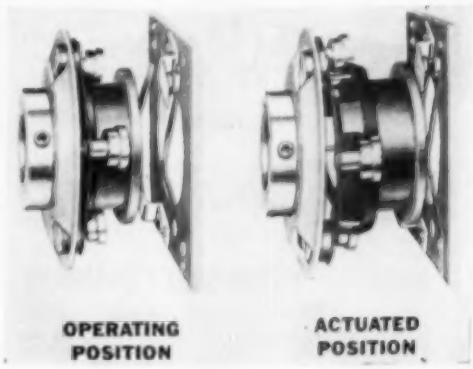
## New Line of Tube Fittings



Crawford Fitting Company has just announced a complete new line of Swagelok tube fittings made of Zytel polyamide resin for plastic tubing where corrosion is a problem. It is stated that Swagelok tube fittings of Zytel are the first to be made in elbows, tees, reducers, adapters, plugs, caps and bulkheads. With Swagelok fittings of metal or Zytel, no preparation of tubing is necessary. You merely insert the tubing in the fitting and tighten the nut. ITS NEW

## Centrifugal Switch

The new Syncro-Snap under-speed unit is the latest development to be added to the line of Syncro-Snap centrifugal speed control switches, produced by Torq Engineered Products, Inc. This new switch is especially designed, according to the manufacturer, to eliminate the dangerous consequences of overloading as well as belt slippage or breakage, or other conditions which would reduce rpm on mechanical or electrical devices. At a predetermined minimum speed, it will stop the operation of the unit.




While operating at normal speeds, the rotary section of the Syncro-Snap under-speed control does not touch the stationary switch. No friction or wear is involved. Only when speed falls below the predetermined minimum does the Syncro-Snap move. Three parts comprise the Syncro-Snap switch, all of which are frictionless in operation. The action of the switch is determined by speed alone, regardless of voltage or load. Each switch possesses uniform operating characteristics, which permits dependable use of mass-production assembly techniques. Additional information is available from Mr. J. Greenhut, Torq Engineered Products, Inc., Interstate Street, Bradford, Ohio, Phone BEdford 2-4100. ITS NEW

## Dynamometer Protects Crane

The danger of damaging cranes through their dumping excessive loads has been virtually eliminated in the yards of the Timken Roller Bearing Co., Canton, Ohio. This was accomplished by the installation of a dynamometer as a scale between the lift hook and the load. In this position, the operator can see instantly if the weight-radius capacity of the crane is exceeded when a load is picked up.

The Dillon dynamometer in the picture of the Timken crane has a capacity of 0-50,000 lbs. However, the instruments also are available in 12 other ranges from 0-500 up to 0-100,000 lbs. All will stand accidental overloads of up to 25% without injury to calibration. For complete information, write W. C. Dillon & Co., Inc. P.O. Box 3008, Van Nuys, Calif.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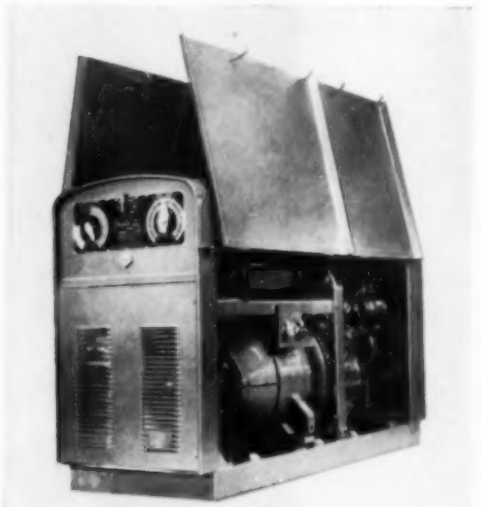
## Represents Cooper-Bessemer

Frank W. Quiggan

Frank W. Quiggin has been appointed to the Washington district office of the Cooper-Bessemer Corp., according to Robert F. Lay, general sales manager. Mr. Quiggin will work under Charles G. Cooper, vice president and district sales manager. He will be responsible for engineering and sale of compressors and engines to federal agencies as well as for industrial use. An engineering graduate of the North Gloucestershire Technical College and of the Royal Air Force School of Aeronautical Engineering, Mr. Quiggin was a Royal Air Force engineering officer from 1940 to 1946. He worked for DeHavilland Propeller Co. before joining Cooper-Bessemer in 1948. He is a member of both the ASME and SAE.

## Hercules Powers New Welder



A new welder, powered by a new Hercules diesel engine, has been placed on the market by the Lincoln Electric Co., Cleveland, O. It was designed for construction, pipeline, and structural welding work. Called the "Shield-Arc SAE 250," it is rated 250 amperes at 40 volts, 60% continuous duty cycle.

The Hercules Motor Corp. has designated its new engine the DIX-4D. It is a 4-cylinder, 4-cycle engine with 166 cu. in. displacement, rated 39 hp at 1700 rpm. It is equipped with a 12-volt starting motor and an ether injection system for cold weather starting.

Lincoln Electric states that the new welder "weighs approximately 20% less, is one foot shorter in length, and costs 25% less than a comparable 300-ampere welder. Compared to operating a gasoline engine, only two-thirds as many gallons of fuel are required per horsepower hour." (ITS NEW)

## A Civil Defense Installation

Diesel-electric generators for emergency purposes are being installed in a multi-million dollar food distribution center being built in Hialeah, Fla., by Food Stores of Florida, Inc. The plant will cover 18½ acres and will have 50,400 sq. ft. of space refrigerated. Twin Model D397 Caterpillar diesels with 300-kw Columbia generators will maintain temperatures in case of local power failures. The installation will include Young heat exchangers and Burgess-Manning exhaust snubbers. The photograph was made as one of the 17,000-lb. engines was being delivered.

## Regional Manager

B. C. Sears

The appointment of B. C. Sears as regional manager, Great Lakes Region, with headquarters at Cleveland, Ohio, has been announced by Loyd E. Williams, manager - Distribution, Cummins Engine Company, Inc., Columbus, Indiana. Mr. Sears is a 1946 graduate of Purdue University, with a degree in mechanical engineering. He joined Cummins in 1946 as a junior test engineer; became a sales engineer in 1948; and in 1950 was assigned to the Atlanta regional office as assistant regional manager. In 1953 he was transferred to Chicago as assistant regional manager for the Central Region. Earlier this Spring, he was named regional manager-Rocky Mountain Region at Denver, a position he held until his latest assignment.

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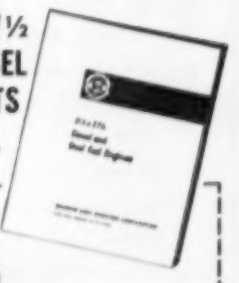

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# Here's the "follow up" to an outstanding story of C-B Diesel Performance

BACK in 1948, the advertisement reproduced here told of twin 1100 hp Cooper-Bessemer Diesels in the towboat "Frances M. Hougland" . . . how the boat traveled 57,170 miles and delivered 1,400,300 barrels of gasoline prior to her first engine overhaul.

Today, seven years and 15,000 operating hours later, results from the second overhaul prove equally as interesting . . . average cylinder liner wear of only .009, total expense for complete overhaul of both engines — $1,386.36 . . . mighty low cost for seven years of ready, reliable service from her Cooper-Bessemer engines.

This outstanding record is one more addition to the many chapters already in the Cooper-Bessemer performance story. We hope you keep it in mind when next you consider marine powering or repowering.

Like two trips around the world
without an overhaul!
If you want to see trouble-free mileage as a yardstick for diesel performance, look at the record of the Frances M. Hougland. This Cooper-Bessemer-powered boat traveled 57,170 miles and delivered 1,400,300 barrels of gasoline before needing her first overhaul!
And they were fast miles, too! For example: despite a 44-hour loss in loading and fog, she made the round trip between Paducah and Port Arthur in only 15 days, with a 64,000 barrel load!
Records like this give pretty good evidence that Cooper-Bessemer power is your best bet for prolonged economy in workboat performance.
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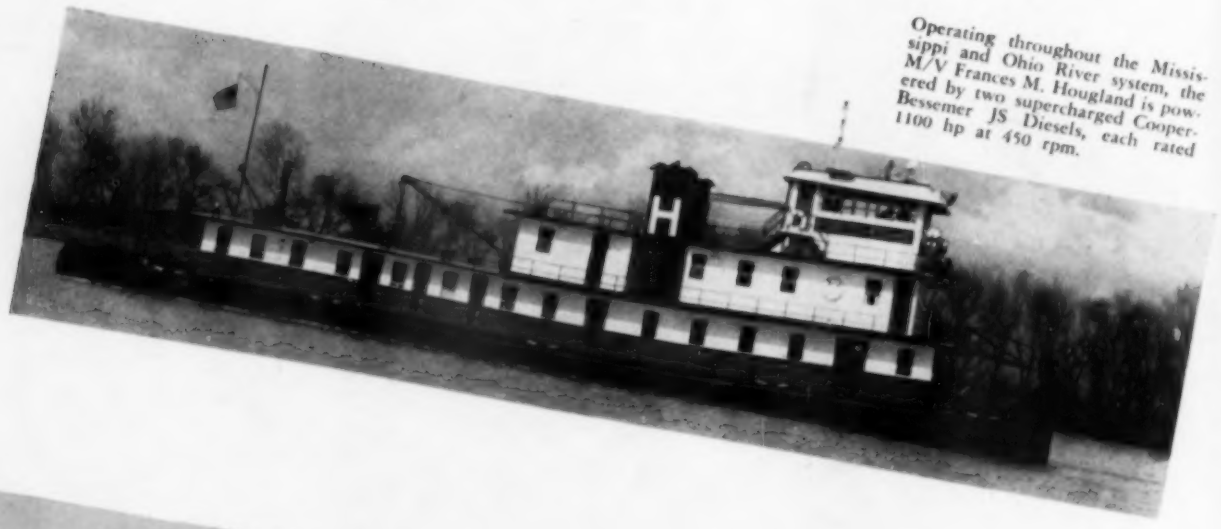

Operating throughout the Mississippi and Ohio River system, the M/V Frances M. Hougland is powered by two supercharged Cooper-Bessemer JS Diesels, each rated 1100 hp at 450 rpm.